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The

RAINBOW

THE COLOR COMPUTER MONTHLY MAGAZINE

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Patrick D. Grengs II

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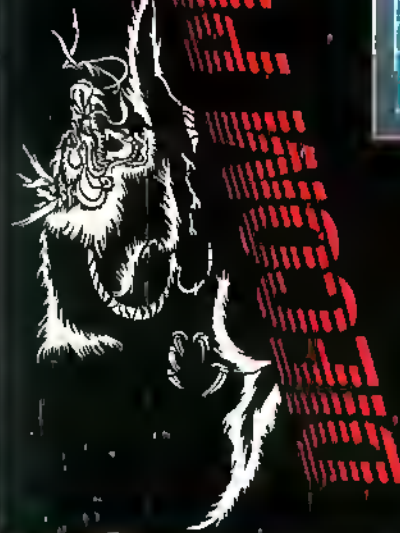
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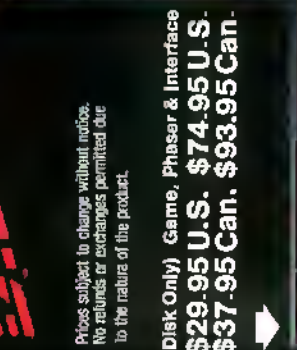
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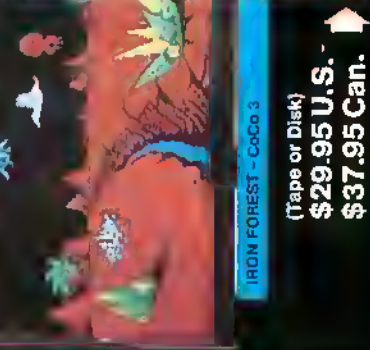
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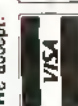
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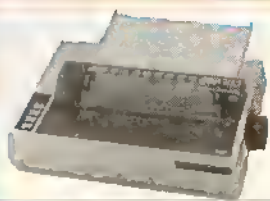
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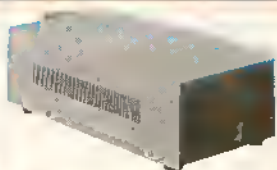
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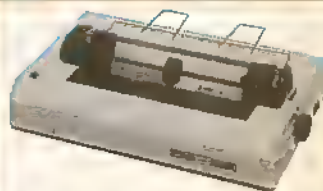
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28



41

72 **Getting More Power From Your CoCo Keyboard**

Michael Sweet
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like the big boys — and more*

Features

14 **Bills! Bills! Bills!**

David Turner
*Organize household
expenses in a fair, precise
manner*

51



28 **Super Stamper: The Elastic Rubber Graphics Stamp**

Jeremy Spiller
*Two new graphics
commands for PMODE
image manipulation*

41 **The Font Master**

Eric Wolf
*Replace CoCo 3's built-in
HPRINT font*

48 **Getting Graphic**

William P. Nee
*Part IV: Machine Language
Made BASIC*

51 **Breaking the Four- Color Barrier**

Rusty Cutchin
*Add many more than four
colors in HSCREEN4*

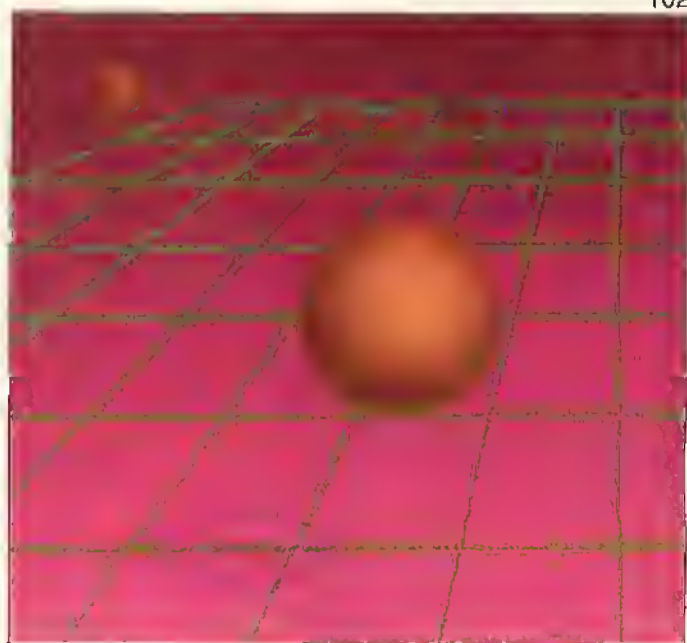
58 **Quick Fixes**

Marty Goodman
*Three do-it-yourself fixes for
the hardware hacker*

102 **Warped Animation**

Patrick D. Grengs II
*Create whirlpools and waves
in an undulating grid*

102



Novices Niche


86
Fright Night
Patricia Moos

87
Ad Infinitum
Rick Weshenfelder

87
Typing Up DRAW Strings
Kelran Kenny

88
Seeing the Bigger Picture
Erich Sweaney

88
Taking on the One-Armed Bandit
Kenneth Carlin

 The cassette tape/disk symbols beside features and columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE and RAINBOW ON DISK. Those with only the disk symbol are not available on RAINBOW ON TAPE. For details, check the RAINBOW ON TAPE and RAINBOW ON DISK ad on Page 126.

Departments

Advertisers Index	160
Back Issue Info	93
CoCo Cat	104
CoCo Gallery	26
Corrections	84
Hints	83
Letters to Rainbow	6
Maxwell Mouse	36
One-Liners	54, 134
Racksellers	158
Received & Certified	130
Scoreboard	106
Scoreboard	
Pointers	108
Submitting Material to Rainbow	154
Subscription Info	155

Columns


98
BASIC Training
Joseph Kolar
New directions

56
CoCo Consultations
Marty Goodman
Just what the doctor ordered

64
Delphi Bureau
Cray Augsburg
Time for a change and Hutchison's database report

40
Doctor ASCII
Richard Esposito
The question fixer


10
PRINT#-2,
Lawrence C. Falk
Editor's notes


90
Wishing Well 
Fred Scerbo
Two for the price of one

"BASICally Speaking,"
"Education Notes" and
"Turn of the Screw"
will return next month.

Rainbowtech

143
Accessible Applications
Richard A. White
Introducing the OS-9 Team

132
Barden's Butter 
William Barden, Jr.
Assembly language for the complete novice: Part II

147
KISSable OS-9 
Dale L. Puckett
Another cry for standards

Product Reviews

AI-Write/Daniel Jimenez	117
BASIC Screen Editor/Second City Software	116
Disk Manager Tree/Alpha Software Technologies	115
HELLO/BAS/R.C. Pierce Software	125
Home Bingo/Williams Enterprises	129
Inventory Manager/Forrest Enterprises	113
Moon Runner/Nick Bradbury	112
Night of the Living Dead/Adventure Novel Software	110
Quest for the Ring/RTB Software	128
Shadow World/Prodek	116
Word Power 3.1/Microcom Software	120

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BACK TALK

Editor:

I would like to comment on two articles in your June '88 issue: David Huag's article, "Internal Sound," Page 99, and Michael F. Wiens' article, "CoCo 3 Potpourri," Page 158. David's article, which describes how to install a speaker and amplifier inside a CoCo to produce sound with monitors that lack this capacity, is flawed in several respects.

First, David suggested using a 9-volt battery as the amplifier's power supply. Such extra power would be expensive. Instead, the correct way to power such an amplifier is off the CoCo's own power supply. For CoCo 1s and 2s, a +10-volt source is available at the positive side of the power supply circuit's 10,000 mfd filter capacitor. The big filter capacitor is a black or gray cylindrical object about 2 inches long and one-half inch in diameter, which is marked with its value (10,000 mfd or 4,700 mfd). The positive and negative sides are indicated by a marking and arrow. CoCo 3s have a convenient +10-volt source at the junction of the cathodes of the power supply's two biggest diodes. The diodes are black, cylindrical objects, one-half inch in diameter and one-half inch long, which are marked with a single silver band on the cathode side of the diode.

Second, David recommended making your own amplifier from "scratch" with an LM 386 chip. While his circuit will probably work, why go to all the trouble? Radio Shack sells a speaker amplifier in a nice little package (Cat. No. 277-1008), which only costs \$12 and has everything you need to install sound in your CoCo. It fits beneath the keyboard if you remove its back plate, and the Radio Shack's speaker has been baffled to provide better sound.

Finally, though David showed how to find the sound on his CoCo, his instructions won't work on some other CoCo models. David's instructions work fine on CoCo 1s. But on most CoCo 2 models, and all CoCo 3 models, the sound line is at Pin 1 of the custom DAC chip. This is a 20-pin chip marked SCC77526P on most computers. On the CoCo 3 sound can also be obtained, of course, from the audio output jack in the computer.

Next, Michael's article presents a rather faulty technical tip. His first hardware tip says that owners of the old CoCo 1 disk controller (Cat. No. 26-3022) can use the controller on a CoCo 2 or 3 if they rig up a +12-volt source for that card. Although this is true for the CoCo 2, Michael does not mention that, even with the 12-volt source, the controller will not work properly at double CPU speed. Therefore, if you run OS-9 Level II or any Disk BASIC program that does disk I/O at double processor speed, at best the controller won't work, at worst it will operate unreliably — occasionally crashing disks. The reason is that the

data separator circuitry on that old controller is a bit sloppy, and there is no simple fix for that problem. Both my column and the "Doctor ASCII" column have warned of this problem before. I strongly advise readers not to use that controller in their CoCo 3s. Buy a new one, instead.

Marty Goodman
San Pablo, CA

REVIEWING REVIEWS

Editor:

Needless to say, we at SPORTSware were very pleased, even honored to see the treatment given to the *Wargame Designer* system in the August '88 issue [Page 126]. We tried to create a game-designing system that would fill what we saw a void in the wargame and Adventure game market.

We would also like to comment on the reviews of John Herbert, reviewer of *Wargame Designer*. We have noticed his reviews in the past and have always found them enjoyable. His unique style and humor are refreshing. Unlike some reviewers, who feel that a recitation of the user's manual is enough, you can always tell whether or not Mr. Herbert enjoyed a software package. Feelings are what reviews are all about, and John Herbert relates them with ease. Let's hope that he continues to share his time and talent with the CoCo Community.

Paul L. Ohnstead
President

Fair is Fair

Editor:

First, I would like to commend you for your fine magazine. RAINBOW's excellent articles and reviews have helped me enjoy my CoCo. I pay particular attention to RAINBOW's reviews. After reading reviews on *CoCo Newsroom*, *King-Fu Dude*, and *Rommel 3D*, I purchased the products. I found certain flaws that were not properly covered in the reviews, and I would like to comment on them now.

Despite *CoCo Newsroom*'s icons, you cannot return to the main menu from type-up. You must re-boot the program. Although knowing this may not have stopped me from buying this program (for it is excellent in all other ways), I think that the review should have mentioned this problem.

King-Fu Dude's review mentions that the program is copy-protected. The copy-protection does not appear to be benign. I couldn't get the program to boot. When I called the author, he said that he had encountered this problem before. The fault seems to be with the timing of some drives and the way the program boots the encrypted graphics from Track 0. I have returned the game, and the company is still working on the problem. Perhaps this is an example of the way a vendor can actually thwart future purchases through copy-protection.

Finally, the graphics in *Rommel 3D* have been compromised by the program's demand for speed. Although the game moves quickly and is mildly entertaining, I've seen better games and graphics in BASIC published in THE RAINBOW. I realize that some of my comments (especially for the last product) are subjective, and I see only two choices for me and for others who purchase "less than perfect" software: complain to the vendor or just accept the flaws.

Product reviews should be fair. They let your readers know what is new on the market. They should also temper and confirm the advertiser's claims. I will continue to read your magazine and purchase software from the vendors you review.

Wayne Montague
Mississauga, Ontario

We agree that reviews should be fair. Therefore, we will be working toward more serious "play testing" in-house. We regret it if we've allowed recommendations for flawed products to slip through.

HINTS & TIPS

Editor:

Paul Pritchett [July '88, Page 7] requested a way to hard copy *Micro Illustrator* pictures. I suggest these steps. PCLEAR B your CoCo; boot up *Micro Illustrator* and load the picture from the disk. Return to Disk BASIC by removing the disk and pressing RESET twice. Then, run the following program:

```
10 PMODE 4,1: SCREEN 1,1 'WATCH
OUR PROGRESS
20 FOR X=6252 TO 14396 'PICTURE
SITS HERE
30 A=PEEK(X):POKE X-4668,A 'MOVE
PICTURE
40 NEXT X: SOUND 20,1 'BEEP WHEN
DONE
```

This will move *Micro Illustrator*'s picture to Disk BASIC graphics pages 1 through 4, where any trusty graphic dump program can do its stuff. Hope this helps!

Charles Doane
Miami, FL

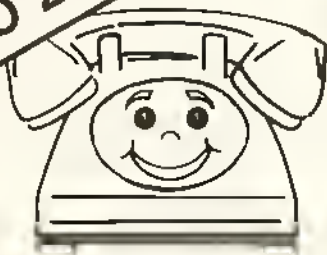
CoCo 3 Artifacts

Editor:

I have tested some machine language programs with the CM-8 patch program listed in the February '88 issue ["Artifact Colors on CoCo 3's RGB," Page 114]. Each of the following will display color when executed on a CoCo 3 with a CM-8 monitor:

From Tom Mix: *Donkey King*, *Draconian*, *Buzzard Bait*, *Brew Master* and *Skyway*.
From Spectral Associates: *Lancer*, *Miss*

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From The Rugby Circle: *Caterpillar.*

From Mark Data: *Tut's Tomb.*

From Anteco Software: *8 Ball.*

From T&D Software: *Able Builders.*

From Adventure International: *Arex.*

From Factory Programming: *Outhouse.*

Note: If you use the patch while playing a game that switches between the graphics screen and text screen, sometimes you will only see vertical and/or horizontal lines. Usually this is not critical because the text screen asks you to enter the number of players, the names, the level, etc. If you play the game without the patch and memorize the screen text, you should be able to play the game with the patch. Also, some of the programs mentioned were on a ROM pack but have been transferred to a disk. Don't try to use the patch with a ROM pack — you can't.

Perry M. Dneek
Rosenort, Manitoba

A CoCo 2 Color Catalyst

Editor:

Thanks to everyone in the CoCo Community who took the time to drop a line or call about *Color Catalyst* ["Changing the Language," June '88, Page 168]. As it appears in the magazine, the program will

only run on the CoCo 3 and certain models of the CoCo 2. (Tandy changed more than the keyboard when it upgraded our favorite machine.) The following changes in Listing 2 will allow you to use *Color Catalyst* on your CoCo 1 or 2:

```
6 POKE359,57:M=113:N=25:PRINT
  @13,"COLOR";:PRINT@36,A$;:
  PRINT@68,B$;:PRINT@100,C$;
  8 PRINT@166,"CUSTOM BASIC
  UTILITY";:PRINT@232,"BY MARC
  CAMPBELL";:PRINT@489,"[C]
  MCMLXXXVII";
  16 CLS:PRINT"DO YOU WANT TO
  EXIT?(Y/N)":EXEC44539:A$=INKEY
  $:IFA$="N"THEN10ELSECLS:NEW
  30 GOSUBB2:PRINTS$"BLACK CHAR
  ACTERS ON GREEN",S$"BLACK CHAR
  ACTERS ON ORANGE":S=163:E=195:
  GOSUBB3
  31 IFQ=1THENPOKE65314,7ELSE
  POKE65314,8
```

Delete Line 17 and lines 125 through 128.

Please note that the reset patch and many of the custom display options will be lost, but the other aspects of the program should work properly. If you experience an f/O Error when loading a custom version of BASIC, put the machine in an all-RAM mode by running Listing 1 and try again.

My thanks to Chuck Schermann, president of Club 6809 in Massachusetts, for bringing this problem to my attention and helping me fix it.

Marc Campbell
Ephrata, PA

INFORMATION PLEASE

Editor:

I really enjoy your magazine, especially the letters. I've gotten quite a few ideas from this section.

I enjoy *Hall of Kings* and would like to buy *Hall of Kings II* or *III*. However, Prickly Pear Software is no longer in business. Is anyone else selling these games? I would like to continue the Adventure.

Jerry M. Bedell
St. Peters, MO

Glen Dahlgren, the original programmer of *The Hall of Kings*, has obtained all rights from Prickly Pear Software to market his trilogy. You can order the programs from Glen at: Sundog Systems, 21 Edinburg Drive, Pittsburgh, PA 1523; (412) 372-5674.

Computer Musicians

Editor:

I am seeking help from all CoCoists who use their CoCos for MIDI applications and music composition or arrangement. Has anyone heard of a voicing program for the Yamaha FB-01 that will work with a CoCo 2 or 3? I do some intricate MIDI work that involves the FB-01, and I need a voicing program that allows me to modify some of the voices on the FB-01.

All other major brands of computers have voicing programs that let them modify the sounds of the FB-01. I hope that such a

program exists for the CoCo. If it doesn't, such a program would be very lucrative to write.

Val Burke
P.O. Box 86
Red Oak, GA 30272

KUDOS

Editor:

I just finished wading through a stack of bills. The only one that I didn't mind was my RAINBOW subscription renewal. Indeed, you even include a postage-paid envelope for the subscription. Subtle touches like this keep CoCo fans coming back — even when Radio Shack ignores the CoCo and praises its PC compatibles.

You are a class act, RAINBOW.

Mike Shay
Lebanon, PA

In Praise of Rainbow Advertisers

Editor:

I just wanted you to know how much I enjoy RAINBOW each month. You perform a great service for all CoCoists. The software companies who advertise in your magazine also maintain high standards. One such company is Gimmesoft. Mr. DiMarco is helpful and considerate to all his customers. My thanks to you both.

Fred Sharpe
Scarborough, Ontario

Confidence-Builder

Editor:

I would like to thank Marc Campbell for his BASIC editor, *Buddy* ["CoCo's Current Companion," July '88, Page 34]. New to computing, and only an average typist, I've been intimidated by long program listings. I've avoided some programs and typed in others with as much enthusiasm as I usually muster for a trip to the dentist. CoCo's built-in editor only added to my frustration.

Buddy has changed all that. The program has more features than my present word processor, is simple to use and works well with my tape system. Since *Buddy* takes the frustration and tedium out of typing in long listings, I ordered several back issues of THE RAINBOW. *Buddy* and RAINBOW are my CoCo's constant companions.

Kay Greenwood
Crystal Springs, MS

PEN PALS

• I am a 19-year-old who would like pen pals from anywhere in the United States. I have a CoCo 2, FD 501 disk drive, DMP-105 printer, CCR-81 cassette recorder/player and a speech/sound cartridge. I would like someone who likes *Doctor Who*, writing and anything in between. It may take some time, but all letters will be answered.

Dennis Duane Ferrell
712 Gloria Grove
Wiggins, MS 39577

• My brother and I are looking for pen pals from all over the country. We are: Scott, age 13, and Andy, age 14½. We have an ECB CoCo 2, DMP-105 and DMP-230 printers, DCM-3 modem, FD 502 disk drive, and a CCR-81 cassette recorder. We will do our best to respond to all letters.

Andy and Scott Brady
51 Barbervon Road
Lake Worth, FL 33467

• I'm 31 years old and own a CoCo 2, tape recorder and a DWP-230. My interests are BASIC and assembly programming (practical programs for me and games for my kids) and word processing. My other interests are history, literature, politics and religion. I will answer all letters.

Dan Weaver
66 Bunn St.
Amsterdam, NY 12010

• I am looking for a pen pal who has the same setup as my system. So far, I have a 64K CoCo 2 and a cassette recorder. I am looking for someone who is a novice like myself who might be able to teach me more about this new computer of mine.

Patti French
Rt. 2, Box 9
Grafton, ND

• I am 37 years old and have a 64K CoCo with disk drive and a DMP-130 printer. I enjoy anything that has to do with computers. I would like to hear from anyone, any age and from anywhere in the world.

Chuck Flowers
P.O. Box 246
Rio Dell, CA 95562

• I would like a pen pal from anywhere. I have a CoCo 2 with one disk drive and two joysticks. I am 10 years old.

Kevin Lewis
256 Elton Crescent
Thunder Bay, ON
Canada P7C 5T5

• I am 16 years old and am looking for pen pals from all over the world. My computer system consists of a CoCo 3, DMP-105, two double-sided disk drives and a modem. I like to program in BASIC09, and I collect CoCo 3 pictures.

Heath Dingwell
Rt. 2 Box 230
Litchfield, CT 06759

• I am 16 years old, and I have the CoCo 2 and 3, FD 500 disk drive, DMP-105 printer and CCR-81 cassette. I am looking for pen pals who enjoy arcade and Adventure games.

Shane Pasiechnyk
P.O. Box 344
Marysville, BC
Canada V0B 1Z0

• I am 15 years old. My family and I own four computers — MC-10, CoCo 2, CoCo 3 and Tandy 1000 EX. We have a DMP-106 printer. I would like to have pen pals from anywhere in the world; age doesn't matter.

Gretchen Silverheel
1633 Summit
Kansas City, MO 64108

BULLETIN BOARD SYSTEMS

• The Port City Exchange is a "Phoenix" BBS system in the Mooresville area. It runs on a 64K CoCo 2 and is up 24 hours a day, seven days a week at (704) 663-6022. The parameters are 300 baud, 8-bit, 1 stop bit, no parity. There are multiple message bases and upload/download capacity. *Galactic Conflict* is the online game.

Douglas C. Henderson
(NICKO)
539 Dixie Drive
Mooresville, NC 28115

• There's a new BBS in southern California that needs CoCo users! We have room for uploads and downloads and have some great SIGs and message areas. We operate at 300/1200 baud, N-8-1. Call (818) 995-2461.

Scott Shell (SysOp)
Allen Williams (Co-SysOp)
3425 Clairton Pl.
Encino, CA 91436

• The Drunk Drive [call (517) 893-3091] now has a large archived CoCo download area. The Plastered Board [at (517) 892-7885] and Warped Board [(517) 686-7598] also support the CoCo with a variety of downloads. All are N-8-1, 300/1200 baud and run GT Powercomm. Press Q at the menu to have up- and download capacity. Press C to see all file categories. Press F to see all file descriptions. The Drunk Drive and The Plastered Board are online 24 hours a day. Warped Board is online from 6 a.m. to 3 a.m.

Ron Sujkowski
1806 34th St
Bay City, MI 48708

• The Chip to Chip is running at 300/1200 baud, 24 hours a day on a 512K CoCo 3. The system uses PBBS software and features message and software exchange for IBM, CoCo and CBM. New members must fill out an online application and use their real names. There is 20 Meg of disk storage space. The SysOp is Allen Jones. Call (902) 539-7743.

David Brown
New Waterford, NS
Canada B1H 4K4

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Fatsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.



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Unparalleled Power packed in this 100% ML Word Processor written from scratch for the CoCo 3! No other word processor offers such a wide array of features that are easy to learn & use.

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Word Power 3.2 runs at double-clock speed and uses the **true 80-column display** with lowercase instead of the graphics screen. The result is lightning fast screen reformatting and added speed! All prompts are displayed in

plain English in neat colored windows. The current column number, line number, page number, percentage of free memory is displayed at all times. Even the **page break** is displayed so you know where one page ends and the other begins. The Setup program allows you to change fore/background colors as well as (in)visible carriage returns. Word Power 3.2 can be used with RGB/Composite/Monochrome monitors as well as TV.

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Word Power 3.2 gives you over 72K on 128K and over 450K on 512K CoCo 3 for Text Storage - more memory than any other CoCo word-processor. Period.

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Word Power 3.2 has one of the **most powerful and user-friendly full-screen editor with word-wrap**. All you do is type. Word Power takes care of the text arrangement. The unique **Auto-Save** feature saves text to disk at regular intervals for peace of mind.

Insert/Overstrike Mode (Cursor Style Changes to indicate mode); OOPS Recall during delete; Type-ahead Buffer for fast typers; Key-Repeat (adjustable); Key-Click; 4-way cursor and scrolling; Cursor to beginning/end of text, beginning/end of line, top/bottom of screen, next/previous word; Page up/down; Delete character, previous/next word, to beginning/end of line, complete line, text before/after cursor; Locate/Replace with Wild-Card Search with auto/manual replace; Block Mark, Unmark, Copy, Move & Delete; Line Positioning (Center/Right Justified); Set/Reset 120 programmable tab stops; Word-Count; Define Top/Bottom/Left/Right margins & page length. You can also highlight text (underline-with on-screen underlining, bold, italics, superscripts, etc.). Word Power even has a **HELP** screen which can be accessed any time during edit.

SPLIT-SCREEN EDITING

Splits the screen in half so you can view one portion of your text while you edit another. You'll love it!

MAIL-MERGE



Ever try mailing out the same letter to 50 different people? Could be quite a chore. Not with Word Power 3.2! Using this feature, you can type a letter, follow it with a list of addresses and have Word Power print out personalized letters. It's that easy!

CALCULATOR

Pop-up a 4-function calculator while you edit! Great for tables!

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Word Power 3.2 creates ASCII format files which are compatible with almost all terminal/spell-checking & other word-processing programs. Allows you to Display Free Space, Load, Save, Append & Kill files. The **ARE YOU SURE?** prompt prevents accidental overwriting & deletion. You can select files by simply cursoring through the disk directory. Supports double-sided drives & step-rates.

PRINTING

Word Power 3.2 drives almost any printer (DMP, EPSON, GEMINI, OKIDATA, etc). Allows options such as baud rates, line spacing, page/print pause, partial print, page numbering/placement, linefeeds, multi-line headers/footers, right justification & number of copies. The values of these parameters & margins can be changed anytime in the text by embedding Printer Option Codes. The **WHAT YOU SEE IS WHAT YOU GET** feature allows you to preview the text on the screen as it will appear in print. You can view margins, page breaks, justification & more.

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DOCUMENTATION

Word Power 3.2 comes with a well-written instruction manual & reference card which makes writing with Word Power a **piece of cake**! Word Power 3.2 comes on an **UNPROTECTED** disk and is compatible with RSDOS. Only \$79.95

(Word Power 3.1 owners can get Word Power 3.2 Upgrade **FREE** by sending proof of purchase & \$5.00 to cover S&H costs & instructions)

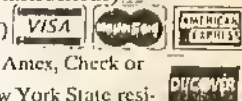


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October Magic

This is a happy month! There are a whole bunch of things to be happy about right now. First of all, remember that I write these columns a lot earlier than they appear in THE RAINBOW. Production schedules make this necessary, of course, so it is really an interesting exercise from an intellectual point of view: First, I have to project myself into the future and try to place myself in the time you will be reading this; second, I am as usual "full" of something that has just happened in real time (as they say) and want to tell you about it.

As to what's happening in October itself — it is RAINBOWfest! That really makes me happy, because I sometimes liken RAINBOWfest to the ancient stories of the Scottish Clans' annual gathering. Each time I walk into our convention hotel, I can't help but think of the "Gatherin' o' th' Clans" from legend. Each show is alive with anticipation of new things, new products and, most important of all, new people. We all make new friends and we all renew old acquaintances. And we get an infusion of spirit for our CoCo Community.

All of this is by way of saying I hope you will join us in Princeton October 21st through 23rd.

October, too, begins the start of our busiest half of the year. During the summer, with family vacations, with school out, with the weather so nice, almost everyone's CoCo activity drops a little bit. Why, I remember one year Dick White wanted to take his CoCo on a camping trip with his family, and his wife threatened to hide the batteries he had rigged up!

September means back to work full time and back to school for so many of you (educators as well as students). I know computing sometimes takes a back seat to getting those schedules "set up." But things have usually settled down by October, and we're ready to go. October also means that we have lots of new things on the horizon. After all, the pre- and post-

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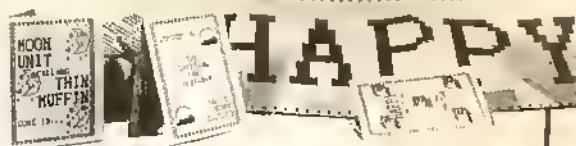
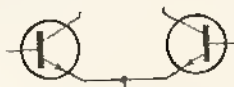
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holiday seasons are the prime sales times for Color Computers. All those software and hardware people are working hard to come up with some new ideas to make your CoCo even more enjoyable.

But here in Prospect, Kentucky, as I write this I am only projecting into October. Still, it is a very happy month right now — perhaps some “October magic” is taking place!

Just a few days ago my daughter Wendy married Ira Barsky. Many of you who have been to RAINBOWfest may have met Wendy, and probably almost all of you have met Ira. My other daughter, Laurie, was Maid of Honor, and it was a very happy day for every one of us.

Long-time readers of this column will probably be asking where Sacy is living, now that Wendy has “fled the nest.” Sacy is Wendy’s teddy bear of many years who was almost lost when Wendy took a “Semester At Sea” and someone picked up her duffle bag by mistake as she landed back in the United States in Seattle.

*“October . . .
means that we
have lots of new
things on the
horizon.”*

Well, that’s the other half of the story of why this is such a happy month for all of us here.

Sacy put on a bow tie and was going to live with his “human grandfather” (me) for a couple of weeks, since Wendy somehow felt it inappropriate to take a teddy bear on her honeymoon. However, several days before the wedding some chest pains sent me to the hospital, and a few days after the wedding I went in for an angioplasty — a procedure doctors use to remove fatty buildup in coronary arteries.

Wendy and Ira delayed their wedding trip (much to my displeasure, I might add), and Sacy went to live at Wendy’s new home while I was in the hospital. I am pleased to report the procedure came off splendidly, and I was back at the office — although on a limited basis for a while — three days after the angioplasty. Sacy is living here, supervising my recovery, and will stay until Wendy and Ira return from their trip.

So, it is a good month. We’re glad you’re with us. And we’re glad to be with you!

— Lonnie Falk

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- ★ Compatible with “Centronics” Parallel Input Printers
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Some of the Printers That Cannot —

Supply power for the interfaces are Epson, Seikosha, Panasonic, Silver Reed and NEC. If your printer cannot supply power to the interface you can order your interface with the “P” option or you can supply your own AC adapter. We recommend the Radio Shack 273-1431 AC adapter with a 274-328 connector adapter.

Write or call for more information or for technical assistance.

Price List

Model 101	35.95
Model 101P	41.95
Model 104	44.95
Model 104P	51.95
Model 105	14.95
Cassette Label Program	6.95
Pin Feed Cassette Labels:	
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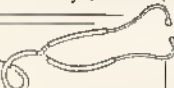
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Displays most games in color on RGB monitors.
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An excellent utility to keep track of your bowl-
ing scores. Allows you to save scores under in-
dividuals or teams. You can edit change, delete,
and compare scores. A must for anyone who
wants to keep track of his or her bowling perfor-
mance. Disk \$19.95 (CoCo 2 version included)

VCR TAPE ORGANIZER



Organize your videotapes with this program.
Allows you to index tapes by title, rating, type,
play time and comments. Also allows you to sort
titles alphabetically & view/print selected tapes.
If you own a VCR, this program is a MUST!!
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COCO 3 SCREEN DUMP



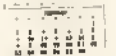
32, 40, 80 column text dump, PMode 4
Graphics Dump. Single Keystroke Operation al-
lows you to take snapshots of your screens even
when programs are running! Works on DMP's,
Epson, Gemini and compatibles. CoCo 1, 2 and
3. Disk \$24.95

HOME BILL MANAGER



Let the CoCo keep track of your bills. Allows
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Generate monthly calendars on your printer for
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Advanced disk operating system for CoCo 3.
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A program to help roommates organize expenses in a fair, precise manner

Bills!



Bills!

Bills!

By David Turner

```
Susan
STATEMENT DUE DATE IS: 10-15-88
RENT                $175.00
PHONE               $17.10
CATV                $17.50
WATER/SEWER        $15.00
GAS                 $0.00
TRASH               $25.00
ELECTRICITY        $62.25
TOTAL              $311.85
```

UNPAID FROM LAST BILL -\$15.50 CREDIT

PAYMENT \$320.00

TOTAL NOW DUE -\$23.65 CREDIT

```
Susan TO DATE TOTALS
PAYMENTS    RENT    PHONE    CATV    ELECTRIC    WATER    GAS    TRASH
$640.00    $350.00    $36.60    $35.00    $114.75    $30.00    $0.00    $50.00
```

```
Lisa
STATEMENT DUE DATE IS: 10-15-88
RENT                $175.00
PHONE               $39.90
CATV                $17.50
WATER/SEWER        $15.00
GAS                 $38.00
TRASH               $0.00
ELECTRICITY        $20.75
TOTAL              $306.15
```

UNPAID FROM LAST BILL \$0.50

PAYMENT \$310.00

TOTAL NOW DUE -\$3.35 CREDIT

```
Lisa TO DATE TOTALS
PAYMENTS    RENT    PHONE    CATV    ELECTRIC    WATER    GAS    TRASH
$620.00    $350.00    $85.40    $35.00    $39.25    $30.00    $78.00    $0.00
```

Many people today have roommates. One of the main arguments that roommates have is bill payment — who pays what and how much. *Roommate* helps solve that problem and keeps a record of expenses and payments.

When starting the program, you are asked if you are creating a new file or loading a previous file. If you are creating a new file, you are asked the name of the roommate and given a list of expenses. The percentage of each expense to be paid is entered as a whole number, i.e., 90 percent = 90 not .90. When you have entered all the expenses of that roommate, you are prompted for information on the next roommate. Once you have entered information on all roommates, press ENTER to continue the program.

Next, you are asked if you want a printout of each expense that is percentage paid. The printout lists the roommate number and the corresponding percentage of payment per expense. Note that you may exceed 100 percent on any expense, total expenses, or the overall sum of expenses.

You are then asked if you need to change a roommate. This will include the name and all expenses. Simply answer the questions.

David Turner, an Emergency Medical Technician in Little Rock, is interested in computers, photography and astronomy, and has written custom programs for business.

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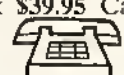
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FUNCTION KEYS



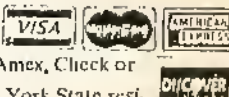
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The program now asks if you need to change the percentage paid. This is similar to the previous prompt. It simply verifies the percentages of payment for each roommate.

Now the program asks for the following expenses: Rent, Phone, CATV, Water/Sewer, Gas, Trash and Electricity. Enter the monthly amounts.

You may give the bill's due date and use the date as a reference for your statements.

The printout option gives you a printout that details expenses and payments. The screen print option lists the expenses on the screen. This is generally used as a review. Use SHIFT-@ to stop scrolling.

After completing the printouts, you are asked to save the data. The data file uses an extension to label each month. You might use the last digit of the year and the month number. For example, January, 1988 becomes 801. December 1988 becomes 812. January 1989 becomes 901. This enables you to keep monthly records on disk. The program also lets you delete the previous month.

If you want to convert this program to cassette, change the following lines:

```
1610 OPEN "I".#-1.EC$
1630 IF EOF(-1) THEN 1660
1640 INPUT#1 to INPUT#-1
1660 CLOSE#-1
```

And delete lines 1490, 1560, and 1590.

Roommate solves many of the problems involved with sharing apartment expenses. The program can help roommates remain friends.

(Questions or comments concerning this program may be directed to the author at P.O. Box 5062, Little Rock, AR 72225. Please enclose an SASE when requesting a reply.) □

✓ 270	.....141	1050	.....85
430	.....197	1240	.....72
630	.....248	1490	.....199
860	.....51	END	.....204

The listing: ROOMMATE

```
10 'COPYRIGHT 1988
20 'BY DAVID H. TURNER
30 'POB 5062
40 'LITTLE ROCK, ARK. 72225
50 CLEAR1000
60 VERIFYON
70 CLS
80 INPUT"<L>OAD PREVIOUS DATA OR
  <C>REATE NEW DATA";R$:1
FR$="L"THEN1580ELSEIFR$="C"THEN9
0ELSE70
90 Z=0
100 Z=Z+1
110 IFZ>6THEN230
120 CLS
130 PRINT"ROOMMATE #"Z
140 LINEINPUT"NAME ";NA$(Z)
150 INPUT"% PAY FOR RENT";RC(Z)
160 INPUT"% PAY FOR PHONE";PC(Z)
170 INPUT"% PAY FOR CATV";CC(Z)
180 INPUT"% PAY FOR WATER ";WA(Z)
190 INPUT"% PAY FOR GAS ";GA(Z)
200 INPUT"% PAY FOR TRASH";SC(Z)
210 INPUT"% PAY FOR APL";AC(Z)
220 GOTO100
230 CLS
240 INPUT"DO YOU WANT A PRINTOUT
  Y/N:";R$
250 IFR$="Y"THENJ=(-2)ELSEJ=0
```

```
260 PRINT#J,"RMMT*RENT *PHONE *C
ATV *APL *WATER *GAS *
TRASH"
270 Z=0
280 Z=Z+1
290 IFZ>6THEN380
300 PRINT#J,Z" "":PRINT#J,USING
"###";RC(Z);
310 PRINT#J," "":PRINT#J,USI
NG"###";PC(Z);
320 PRINT#J," "":PRINT#J,USING
"###";CC(Z);
330 PRINT#J," "":PRINT#J,USING"
###";AC(Z);
340 PRINT#J," "":PRINT#J
,USING"###";WA(Z);
350 PRINT#J," "":PRINT#J,US
ING"###";GA(Z);
360 PRINT#J," "":PRINT#J,USI
NG"###";SC(Z)
370 GOTO280
380 PRINT:PRINT:
390 INPUT"DO YOU WANT TO CHANGE
  A ROOMMATEY/N";R$
400 IFR$="Y"THEN410ELSEIFR$="N"
  THEN510ELSE390
410 PRINT"NAME #"
420 Z=0
430 Z=Z+1
440 IFZ>6THEN460
450 PRINTNA$(Z);:PRINTTAB(18)Z:G
  OTO430
460 INPUT"WHICH ONE";Z
470 LINEINPUT"NAME ";NA$(Z):INPU
  T"% PAY RENT";RC(Z):INPUT"% PAY
  PHONE";PC(Z):INPUT"% PAY CATV";C
  C(Z):INPUT"% PAY APL";AC(Z)
480 INPUT"% PAY WATER ";WA(Z):IN
  PUT"% PAY GAS ";GA(Z):INPUT"% PA
  Y TRASH";SC(Z)
```

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New Double-Sided Double-Density 360K 40-Track 1/2 ht drives for CoCo 2 & 3. These are the same quality drives that are used in IBM® compatible computers. Buy from someone else and all you get is a disk drive. Buy from us and not only do you get a quality drive but \$50 of Free Disk Utility Software (Super Tape/Disk Transfer & Disk Utility 2.1A) and our DISKMAX utility which allows you to access BOTH sides of our drives. It's like buying TWO drives for the price of ONE!! 90-day warranty on all drives!

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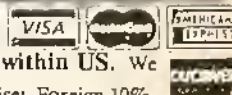
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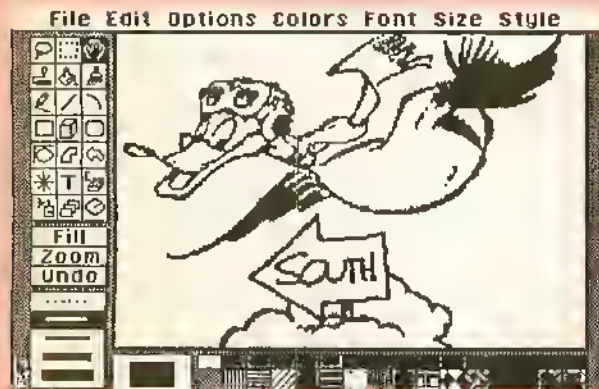
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CoCo Max III is the best because it includes:

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COLORWARE

Max-10

You probably already have a word processor, and you probably wish it had these features:

- ▶ Fully menu driven (CoCo Max style) with point and click marking of text. You don't need the arrow keys!
- ▶ True WYSIWYG (What You See Is What You Get) including variable size fonts, styles (bold, italics, etc.) and graphics.
- ▶ Can print multiple columns on a page.
- ▶ Not limited by printer capabilities; fonts up to 24 points (1/3") high, superscripts, small print, etc.
- ▶ Fully integrated spelling checker (incredibly fast), no need to exit program to check spelling.
- ▶ Graphics can be imported from just about anything (CoCo Max; MGE; BASIC; even Macintosh pictures from a BBS) and resized to fit your document.
- ▶ Full screen preview including graphics.

Max-10 has all these unique features, plus all the features you are used to in your current word processor. Even with all this, you don't give up anything. **Max-10** is easier to use, more intuitive, faster and more powerful than anything else. It's not just a word processor. It's a desktop publisher.



CoCo Max III owners: deduct \$10

Max-10 requires a CoCo 3, at least 1 disk, & joystick or mouse

Printer drivers included: IBM/Epson and compatibles; DMP

105. OMF106, DMP130: CGP220 (B&W): Gemini/Star



Some of the many features of **Max-10**:

- Blinding speed - printing in multiple columns - online dictionary
- spell checking - graphics can be mixed with text - full justification
- of proportionally sized characters - bold, italic, underline
- superscript and subscript type styles - superb file support, just point
- and click - "Undo" lets you correct mistakes - easy to use, no
- commands to remember - any graphics program can be used
- pictures can be shrunk or stretched to fit - right and left alignment
- centering - variable line spacing - page numbering - current
- page number displayed on the screen - variable tab stops - left and
- right margins - tabs and margins can vary in the same document
- cut and paste text and graphics anywhere in the file - page break
- shows on the screen - pull down menus are quick and simple to use
- lightning fast access to any point in the document with the scroll
- box - twenty fonts (styles and sizes), more available - any number
- of character sizes and styles can be mixed on the same line - up to
- more than 120 characters per line, depending on font size, style and
- letters - headers and footers, even with graphics - file compatibility
- with other word processors - right, left, bottom and top margins
- word wrap - set starting page - type ahead - key repeat - key
- click - scroll up and down - ASCII file output for compatibility
- disk directory - kill files- block cut, copy and move - global
- search and replace - paragraph indant - clipboard - merge
- show file (on disk) - free memory display - page count
- paragraph count - word count - graphics can be resized and
- moved - multiple fonts - error recovery - true lowercase - 512K
- memory support (all features work with 128K too) - complete point
- and click cursor control - moving, clearing and changing blocks of
- text is ridiculously easy, just point and click at each end of the text
- block - onscreen ruler - preview file before loading - search and
- replace - disk is not copy protected - more than 35 pages of text

CoCo Max III and Max-10 Perfect Together

You do not *need* **CoCo Max III** to insert and print graphics in **Max-10**. Max-10 works with any graphics creation program, and you can also use graphics downloaded from bulletin boards.

Similarly, you do not *need* **Max-10** to create graphics with text in **CoCo Max III**. There are tremendous lettering capabilities in **CoCo Max III**, with its many fonts, styles, and sizes.

Together **Max-10** and **CoCo Max III** are an unbeatable combination. This desktop publishing system is better than anything you've ever seen on a CoCo. We are so confident that you will use, and enjoy using the two software packages, that we offer an unconditional money back guarantee. Stop wasting your time and effort using inferior or obsolete products. Move up to the new generation of CoCo software now.


```

490 INPUT"ANOTHER CHANGE Y/N";R
$:IFR$="Y"THEN410ELSE500
500 GOTO230
510 '
520 'loaded data and preparation
for printing new statement
530 Z=0
540 CLS:INPUT"DO YOU WANT TO CHA
NGE % PAYS";R$
550 IFR$="Y"THEN410ELSEIFR$="N"TH
HEN560ELSE540
560 INPUT"RENT:";RE
570 INPUT"PHONE:";PH
580 INPUT"CATV:";CA
590 INPUT"WATER/SEWER:";WA
600 INPUT"GAS:";GA
610 INPUT"TRASH:";TR
620 INPUT"ELECTRICITY:";KU
630 LINEINPUT"DATE BILL IS DUE "
;DD$
640 Z=0
650 Z=Z+1
660 IFZ>6THEN700
670 IF NA$(Z)="" THEN 690
680 CLS:PRINTNA$(Z):INPUT"AMOUNT
PAID:";PD(Z)
690 GOTO650
700 'printing statement
710 Z=0

```

```

720 Z=Z+1:IFZ>6THEN1450
730 IFNA$(Z)=""THEN1440
740 PRINTNA$(Z);:INPUT" PRINTOUT
Y/N";HC$
750 IFHC$="Y"THENJ=(-2)ELSEJ=0
760 PRINT#J,NA$(Z)
770 PRINT#J,"STATEMENT DUE DATE
IS: "DD$
780 PRINT#J,"RENT";
790 PRINT#J,TAB(23);
800 PRINT#J,USING"$$,####.##";((
RC(Z)*RE)/100)
810 PRINT#J,"PHONE";
820 PRINT#J,TAB(26);
830 PRINT#J,USING"$$###.##";((PC(
Z)*PH)/100)
840 PRINT#J,"CATV";
850 PRINT#J,TAB(25);
860 PRINT#J,USING"$$###.##";((CC
(Z)*CA)/100)
870 PRINT#J,"WATER/SEWER ";:PRIN
T#J,TAB(25);:PRINT#J,USING"$$###
.##";((WA(Z)*WA)/100)
880 PRINT#J,"GAS ";:PRINT#J,TAB(
25);:PRINT#J,USING"$$###.##";((G
A(Z)*GA)/100)
890 PRINT#J,"TRASH";:PRINT#J,TAB
(26);:PRINT#J,USING"$$###.##";((S
C(Z)*TR)/100)

```

Real BASIC for OS9!

Only \$39.95

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July 11, 1988 14:37:30

Shell

OS9: smode r/s type=0
OS9: lnlz r/s
OS9: r/s cos/mf &
&007

CLEAR

R.S.B. CORP. 1988 BURKE & BURKE
DISK EXTENDED COLOR BASIC 2.1
COPYR. 1982, 1986 BY TANDY
UNDER LICENSE FROM MICROSOFT
AND MICROWARE SYSTEMS CORP.

OK
LOAD "DEMO"
OK
LIST

10 PMODE 4:SCREEN 1,1
20 X=ROUND(204)-1;Y=ROUND(32)-1
30 XS=ROUND(256-X)-1;YS=ROUND(32-Y)-1
40 LINE (X,Y)-(X+XS,Y+YS),PSET,BF

CLEAR

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Our R.S.B. software creates an OS9-compatible version of Disk Extended Color BASIC by reading your CoCo's ROM chips. We add new software for OS9-style graphics, sound, printer, and disk I/O. Of course, you can't use R.S.B. to run machine language programs, and some BASIC commands work slightly differently under R.S.B. Although R.S.B. loads and saves files using OS9's file format, we've also included utilities to transfer BASIC programs and data files between OS9 and BASIC disks.

Did you know that Level 2 OS9 always runs at double-speed? This makes R.S.B. very fast. You must have a CoCo 3 with at least 128K RAM, and a floppy controller with Disk Extended Color BASIC 1.0, 1.1, 2.0, or 2.1 ROM, or CoCo 3 CDOS ROM, to use R.S.B.

Wild & MV Version 2.1 Use "wildcards" with most OS9 commands, or rearrange your directory tree. Features recursive directory searches. A hard disk must! **\$19.95**

Check out these OS9 Utilities
Tools to let you spend less time fighting OS9, and more time using it.

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The Amazing A-BUS

NEW



An A-BUS system with two Motherboards
A-BUS adapter in foreground

The A-BUS system works with the original CoCo,
the CoCo2 and the CoCo 3.

About the A-BUS system:

- All the A-BUS cards are very easy to use with any language that can read or write to a Port or Memory. In BASIC, use INP and OUT (or PEEK and POKE with Apples and Tandy Color Computers)
- They are all compatible with each other. You can mix and match up to 25 cards to fit your application. Card addresses are easily set with jumpers.
- A-BUS cards are shipped with power supplies (except PD-123) and detailed manuals (including schematics and programming examples)

Relay Card

RE-140: \$129

Includes eight industrial relays, (3 amp contacts, SPST) individually controlled and latched. 8 LED's show status. Easy to use (OUT or POKE in BASIC). Card address is jumper selectable.

Reed Relay Card

RE-156: \$99

Same features as above, but uses 8 Reed Relays to switch low level signals (20mA max). Use as a channel selector, solid state relay driver, etc.

Analog Input Card

AD-142: \$129

Eight analog inputs. 0 to +5V range can be expanded to 100V by adding a resistor. 8 bit resolution (20mV). Conversion time 120us. Perfect to measure voltage, temperature, light levels, pressure, etc. Very easy to use.

12 Bit A/D Converter

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Digital Input Card

IN-141: \$59

The eight inputs are optically isolated, so it's safe and easy to connect any "on/off" devices, such as switches, thermostats, alarm loops, etc. to your computer. To read the eight inputs, simply use BASIC INP (or PEEK).

24 Line TTL I/O

DG-148: \$65

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3 1/2 by 4 1/2 in. with power and ground bus. Fits up to 10 I.C.s



ST-143



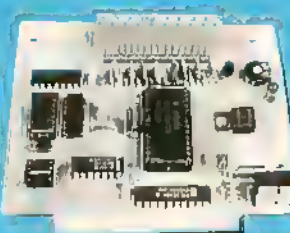
CL-144



RE-140



IN-141



AD-142

Smart Stepper Controller SC-149: \$299

World's finest stepper controller. On board microprocessor controls 4 motors simultaneously. Incredibly, it accepts plain English commands like "Move arm 10.2 inches left". Many complex sequences can be defined as "macros" and stored in the on board memory. For each axis, you can control coordinate (relative or absolute), ramping, speed, stop type (half, full, wave), scale factor, units, holding power, etc. Many inputs: 8 limit & "wait until" switches, panic button, etc. On the fly reporting of position, speed, etc. On board drivers (350mA) for small steppers (MO-103). Send for SC-149 flyer.

Remote Control Keypad Option RC-121: \$49

To control the 4 motors directly, and "teach" sequences of motions.

Power Driver Board Option PD-123: \$89

Boost controller drive to 5 amps per phase. For two motors (eight drivers).

Breakout Board Option BB-122: \$19

For easy connection of 2 motors 3 II, cable ends with screw terminal board.

Stepper Motor Driver ST-143: \$79

Stepper motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with them. Each card drives two stepper motors (1.2V, bidirectional, 4 phase, 350mA per phase). Special Package: 2 motors (MO-103) + ST-143: PA-181: \$99

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Intelligent Voice Synthesizer, 14 Bit Analog to Digital converter, 4 Channel Digital to Analog converter, Counter Timer, Voice Recognition.

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Tandy 1000, 1000 EX & SX, 1200, 3000. Uses one short slot	AR-133: \$69
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TRS-80 Model 102, 200. Plugs into 40 pin "system bus"	AR-136: \$69
Model 100. Uses 40 pin socket (Socket is duplicated on adapter)	AR-135: \$69
TRS-80 Mod 3, 4, 4D. Fits 50 pin bus. (With hard disk use Y-cable)	AR-132: \$49
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CA-163: \$24

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Become Rastann, Warrior King, on a quest to regain his rightful crown hidden deep within his sinister land. Battle monsters, gain magic & weapons, and travel thru harsh wilderness & dark castle dungeons in this medieval realm. From the creator of Kung-Fu Dude comes this awesome arcade game for the CoCo III! Uses the most detailed 320 x 200 16 color graphics & high speed ML code to vault you into a world of fantasy! Dare ye challenge the many perils ahead to become Warrior King? Requires 128k CoCo III, Disk drive, and Joystick \$29.95

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See June '86 & Nov '87 reviews. The epic adventure is back! The largest adventure campaign ever seen for the CoCo is again available. A total of 6 DISK SIDES of intense graphics adventure will have you playing for weeks! Each section is a 2 disk stand alone adventure, but all 3 together form an epic saga! Quest for the legendary earthstone in the ancient dwelling of the dwarfs while you enjoy the classic graphics that made this trilogy famous! Each adventure can be purchased separately for only \$29.95, the lowest price ever, or you can SAVE and purchase the entire set for only \$74.95. Requires 64k, Disk drive, (and composite monitor for the CoCo III). Please specify HALL of the King I, II, or III \$29.95 each or the entire 6 DISK Trilogy for only \$74.95

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See Aug '88 review. This is THE graphics adventure for the CoCo III! Unparalleled 320 x 200 animated graphics will leave you gasping for more! You quest for the Phoenix Crossbow in this post-holocaust world of science and fantasy. Full 4 Disk sides of mind loving adventure! Requires 128k CoCo III and Disk drive. HINT SHEET \$3.95 (+ \$1.00 S&H by itself) Disk \$34.95

KUNG-FU DUDE

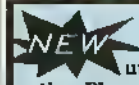
(CoCo I/II/III)

See Feb. '88 review. An exciting arcade game. The BEST karate game ever for the CoCo! Destroy opponents and evade obstacles as you grow even closer to your ultimate objective! Spectacular graphics, sound effects, and animation! Requires 64k, Disk drive, and Joystick. Now displays color on CM8. Disk \$24.95

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(CoCo III only)

See Dec. '87 review. Brilliant colors, sharp graphics, and hot action in this 100% ML arcade game. You'll enjoy hopping Kubix around the pyramid, avoiding Kaderf, Smack, Smuck, & the Death Square! Disk .. \$19.95



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(CoCo I/II/III)

See Dec '86 review. Enter the era of monsters & magic. Search for the legendary power of White Fire throughout the Forbidden Wood & Dark Caverns in this 64k animated adventure! Disk..\$19.95

Champion

(CoCo I/II/III)

See May '87 review. Become a superhero in this action adventure! Disk..\$19.95

Dragon Blade

(CoCo I/II/III)

See Nov '86 review. Slay evil dragon in this 64k animated adventure! Disk..\$19.95

Ordered these 3, 27 Sept 88 (1600)
 C.H.B. to m/c


```

900 PRINT#J,"ELECTRICITY";
910 PRINT#J,TAB(23);
920 PRINT#J,USING"$$,####.##";(K
U*(AC(Z)/100))
930 PRINT#J,"TOTAL ";
940 PRINT#J,TAB(23);
950 X(Z)=RC(Z)*RE/100
960 W(Z)=PC(Z)*PH/100
970 V(Z)=CC(Z)*CA/100
980 U(Z)=KU*(AC(Z))/100
990 L(Z)=WA(Z)*WA/100
1000 M(Z)=GA(Z)*GA/100
1010 O(Z)=SC(Z)*TR/100
1020 PRINT#J,USING"$$,####.##";(
X(Z)+W(Z)+V(Z)+U(Z)+L(Z)+M(Z)+O
(Z))
1030 T(Z)=X(Z)+W(Z)+V(Z)+U(Z)+L
(Z)+M(Z)+O(Z)
1040 PRINT#J,"":PRINT#J,"UNPAID
FROM LAST BILL";:PRINT#J,TAB(25)
;:PRINT#J,USING"$$###.##";(BB(Z)
);:IF BB(Z)<0THENPRINT#J," CREDI
T"ELSEPRINT#J," "
1050 PRINT#J,"":PRINT#J,"PAYMENT
";
1060 PRINT#J,TAB(23);
1070 PRINT#J,USING"$$,####.##";P
D(Z)
1080 PRINT#J,"":PRINT#J,"TOTAL N
OW DUE";
1090 PRINT#J,TAB(23);
1100 BA(Z)=(T(Z))-(PD(Z))+(BB(Z)
)
1110 BB(Z)=BA(Z)
1120 PRINT#J,USING"$$,####.##";(
BA(Z));
1130 IF (BA(Z))>0THENPRINT#J," N
OW DUE"
1140 IF (BA(Z))<0THENPRINT#J," C
REDIT"
1150 PRINT#J,""
1160 PRINT#J,NA$(Z)" TO DATE TOT
ALS"
1170 RT(Z)=RT(Z)+X(Z)
1180 PR(Z)=PR(Z)+W(Z)
1190 CT(Z)=CT(Z)+V(Z)
1200 UT(Z)=UT(Z)+U(Z)
1210 PT(Z)=PT(Z)+PD(Z)
1220 F(Z)=F(Z)+L(Z)
1230 G(Z)=G(Z)+M(Z)
1240 H(Z)=H(Z)+O(Z)
1250 IFHC$<>"Y"THEN720
1260 PRINT#J,TAB(2)"PAYMENTS";
1270 PRINT#J,TAB(16)"RENT";
1280 PRINT#J,TAB(25)"PHONE";
1290 PRINT#J,TAB(36)"CATV";
1300 PRINT#J,TAB(42)"ELECTRIC";
1310 PRINT#J,TAB(55)"WATER";
1320 PRINT#J,TAB(67)"GAS";

```

```

1330 PRINT#J,TAB(75)"TRASH"
1340 PRINT#J,USING"$$,####.##"
PT(Z));
1350 PRINT#J,TAB(10);:PRINT#J,
ING"$$,####.##";(RT(Z));
1360 PRINT#J,TAB(19);:PRINT#J
ING"$$,####.##";(PR(Z));
1370 PRINT#J,TAB(26);:PRINT#J,
ING"$$,####.##";(CT(Z));
1380 PRINT#J,TAB(40);:PRINT#J,
ING"$$,####.##";(UT(Z));
1390 PRINT#J,TAB(49);:PRINT#J,UL
ING"$$,####.##";(F(Z));
1400 PRINT#J,TAB(57);:PRINT#J,US
ING"$$,####.##";(G(Z));
1410 PRINT#J,TAB(65);:PRINT#J,US
ING"$$,####.##";(H(Z))
1420 PRINT#J,STRING$(80,36)
1430 PRINT#J,"":PRINT#J,""
1440 GOTO720
1450 'save to disk
1460 CLS:INPUT"READY TO SAVE TO
DISK Y/N";R$:IFR$="Y"THEN1470EL
SEEND
1470 INPUT"LAST THREE LETTERS FO
R PASSCODE";LT$
1480 FP$="MATE"
1490 PC$=FP$+LT$
1500 VERIFYON:INPUT"PRESS <ENTER
> WHEN READY";R$
1510 OPEN "O",#1,PC$
1520 FORZ=1TO6
1530 WRITE#1,NA$(Z),PT(Z),RT(Z),
PR(Z),CT(Z),UT(Z),BB(Z),F(Z),G(Z)
),H(Z),RE,PH,CA,AP,WA,GA,TR,RC(Z)
),PC(Z),CC(Z),AC(Z),WA(Z),GA(Z),
SC(Z)
1540 NEXTZ
1550 CLOSE#1
1560 INPUT"READY TO DELETE OLD F
ILE Y/N";RD$:IFRD$="Y"THENINPUT
"NAME OF OLD FILE:";OF$:OF$="MAT
E"+OF$+"/DAT":KILL OF$
1570 END
1580 'load old data from disk
1590 INPUT"ENTER LAST THREE LETT
ERS OF CODE";LC$
1600 EC$="MATE":LE$=EC$+LC$
1610 OPEN"I",#1,LE$
1620 FORZ=1TO6
1630 IFEOF(1)THEN1660
1640 INPUT#1,NA$(Z),PT(Z),RT(Z),
PR(Z),CT(Z),UT(Z),BB(Z),F(Z),G(Z)
),H(Z),RE,PH,CA,AP,WA,GA,TR,RC(Z)
),PC(Z),CC(Z),AC(Z),WA(Z),GA(Z),
SC(Z)
1650 NEXTZ
1660 CLOSE#1
1670 GOTO520

```

*"In the beginning there was **VIP Writer** and users saw that it was good.
It was still the best thing around for the CoCo, But it's not the best anymore.
There's a new word processor to claim the crown... **VIP Writer III**.
Setting the Standard for CoCo 3 Word Processing."*

—The RAINBOW SEPTEMBER 1988

VIP WRITER III VS THE COMPETITION

VIP Writer has ALWAYS led the pack with features and now VIP Writer III still leads the way! The chart below illustrates this fact. Telewriter 128 only gives you 48K for text. Why is it called Telewriter 128? Word power 3 gives only 72K! VIP Writer III makes use of over 106K! VIP Writer III is the ONLY CoCo 3 word processor worthy of its name!

WORD PROCESSOR COMPARISON CHART

CoCo3 with 128K	VIP Writer III	Telewriter 128	Word Power 3
Text Storage	OVER 49,000	48,000	72,000
Print Spooler	YES 57,000	NONE	NONE
Total Storage	106,000	48,000	72,000
Spelling Checker	VIP Speller	NONE	FREE WARE
Screen Display	32/40/64/80	40/80	80

SCREEN DISPLAY OPTIONS

As the chart above shows, VIP Writer III offers more screen width options—all with 24 lines and actual lower case letters. It uses the CoCo 3's hardware display and double clock speed and is VERY VERY FAST! You can choose fore and background colors from up to 64 different hues. Color can be turned ON or OFF for the best possible display using a color or monochrome monitor or TV set. VIP Writer III has a built in on-line context sensitive help facility which displays command usage in easy to read color windows.

CUSTOMIZER & PRINTER INSTALLER

VIP Writer III comes with a configuration / printer installation program which lets you customize VIP Writer III to suit your own liking. You can set screen width and colors as well as margins and more. You can also install your own printer and set interface type (serial, parallel or J&M), baud rate, line feeds, etc. Once done, you never have to enter these parameters again! VIP Writer III will load n' go with your custom configuration every time!

TEXT FILE STORAGE

VIP Writer III creates ASCII text files which are compatible with all other VIP Programs as well as other programs which use ASCII file format. You can use VIP Writer III to even create BASIC programs! There is a 49K text buffer and disk or cassette file linking allowing virtually unlimited text space. VIP Writer III works with up to four disk drives and lets you display disk directories and tree space as well as rename or kill disk files. In addition VIP Writer III is 100% compatible with the RGB Computer Systems HARD DISK.

EDITING FEATURES

VIP Writer III has a full featured screen editor which can be used to edit text with lines up to 240 characters long with or without automatic word wrap around. You can select type-over mode or insert mode. There is even an OOPS command to recall a cleared text buffer. Other editing features include: Type-ahead • typematic key repeat and key beep

for flawless text entry • end of line bell • full four way cursor control with scrolling • top of textfile • bottom of textfile • page up • page down • top of screen • bottom of screen • beginning of line • end of line • left one word • right one word • DELETE character, to beginning or end of line, word to the left or right, or entire line • INSERT character or line • LOCATE and/or CHANGE or DELETE single or multiple occurrence using wildcards • BLOCK copy, move or delete with up to TEN simultaneous block manipulations • TAB key and programmable tab stops • word count • line restore • three PROGRAMMABLE FUNCTIONS to perform tasks such as auto column creation and multiple copy printing

TEXT FORMATTING

VIP Writer III automatically formats your text for you or allows you to format your text in any way you wish. You can change the top, bottom, left or right margin and page length. You can set your text flush left, center or flush right. You can turn right hand justification on or off. You can have headers, footers, page numbers and TWO auxiliary lines which can appear on odd, even or all pages. You can also select the line on which they appear! You can even change the line spacing! Parameters can be altered ANYWHERE within your text file!

PREVIEW PRINT WINDOW

VIP Writer III features an exclusive format window which allows you to preview your document BEFORE PRINTING IT! You are able to move up, down, left and right to see centered and justified text, margins, page breaks, orphan lines, etc.

PRINTING

VIP Writer III prints TWICE as fast as any other CoCo word processor! It supports most serial or parallel printers using J&M JFD-CP or Rainbow interface and gives you the ability to select baud rates from 110 to 19,200. You can embed printer control codes anywhere in your text file EVEN WITHIN JUSTIFIED TEXT! VIP Writer III also has TWENTY programmable printer macros which allow you to easily control all of your printer's capabilities such as bold, underline, italics and superscript using simple key strokes. Other features include: multiple copy printing • single sheet pause • line feeds

PRINT SPOOLING

Save up to \$150 on a print spooler because VIP Writer III has a built in print spooler with a 57,000 character buffer which allows you to print one document WHILE you are editing another. You don't have to wait until your printer is done before starting another job!

SPELLING CHECKER

VIP Writer III includes VIP Speller AT NO ADDITIONAL COST! VIP Speller checks text for misspelled words and has a 50,000 word dictionary that can be added to or edited.

DOCUMENTATION

VIP Writer III is supplied with a 125 page instruction manual which is well written and includes many examples. The manual has a tutorial and glossary of terms for the beginner as well as a complete index! VIP Writer III includes VIP Speller. DISK \$79.95

VIP Writer owners: Upgrade to the VIP Writer III Disk for
\$49.95 + \$3 S/H. Send ORIGINAL disk and \$52.95 total.

VIP Database III

VIP Database III features selectable screen displays of 40, 64 or 80 characters by 24 lines with choice of 64 foreground, background, hilite and cursor colors for EASY DATA ENTRY. It uses the CoCo 3's hardware screen and double clock speed to be the FASTEST database available! VIP Database III will handle as many records as will fit on your disks and is structured in a simple and easy to understand menu system with full prompting for easy operation. Your data is stored in records of your own design. All files are fully indexed for speed and efficiency. IN-MEMORY SORT of records is LIGHTNING FAST and provides for easy listing of names, figures, addresses, etc., in ascending or descending alphabetical or numeric order. Records can be searched for specific entries using multiple search criteria. The built-in mail-merge lets you sort and print mailing lists, print form letters, address envelopes • the list is endless. The built-in MATH PACKAGE even performs arithmetic operations and updates other fields. VIP Database III also has a print spooler and report generator with unlimited print format capabilities including embeddable control codes for use with ALL printers. DISK \$69.95

VIP Database owners: Upgrade to the VIP Database III for
\$39.95 + \$3 S/H. Send ORIGINAL disk and \$42.95 total.

VIP Library

/Writer Database Enhanced

The VIP Library /WDE combines all six popular VIP application programs • VIP Database III, VIP Writer III, VIP Speller, VIP Calc, VIP Terminal and VIP Disk-ZAP • into one program on one disk! The program is called VIP Desktop. From the desktop you have instant access to word processing with a spelling checker always in attendance, data management with mail merge, spreadsheet, financial analysis, telecommunications and disk maintenance. DISK \$169.95

VIP Library owners: Upgrade to the VIP Library /WDE for
\$89.90* + \$3 S/H. Send ORIGINAL disk and \$92.90 total.

* Future VIP Library upgrades available at reduced cost!

All products run under RSDOS and are not copy protected.

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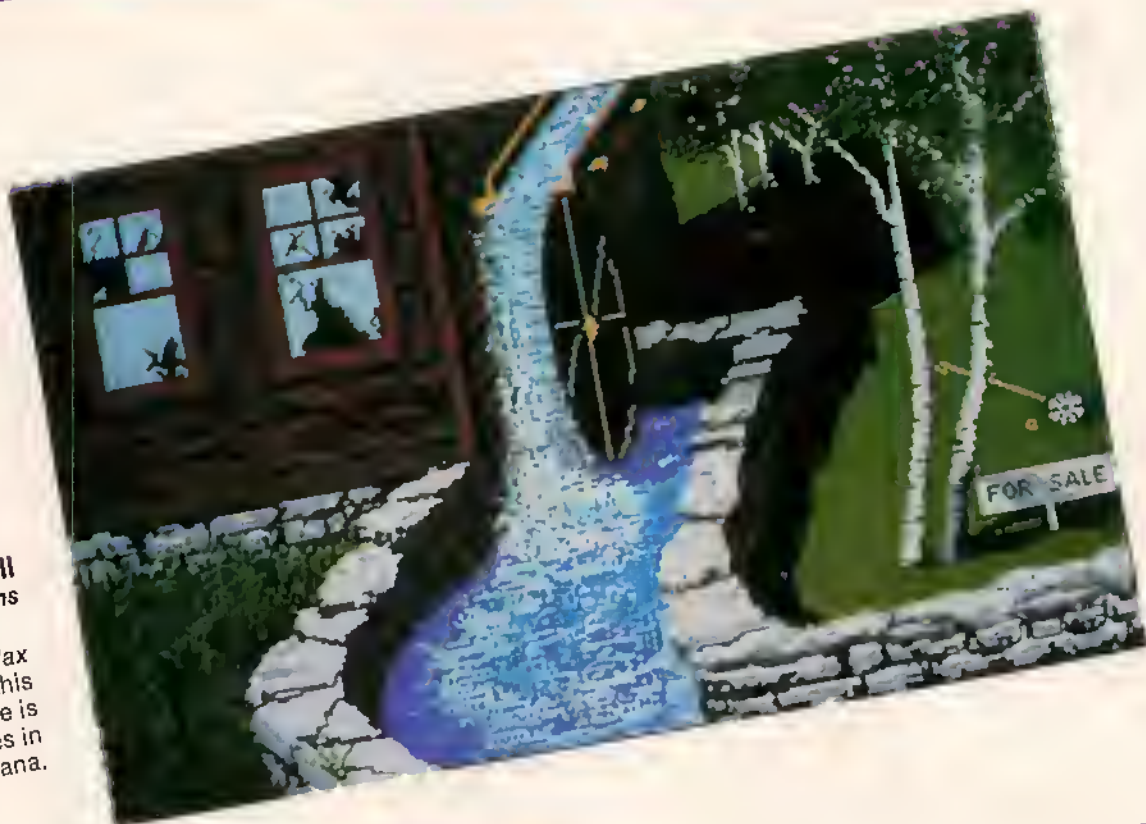
Please add \$3 for shipping and handling. Outside continental US add \$4 S/H. CDD orders and an additional \$2.25. Checks allow 3 weeks for delivery. All other orders are shipped the same day. * Telewriter 128 is a trademark of Logicon. Word Power 3 is a trademark of Spectrum Software.

The CoCo Gallery

1st COCO 3

Mill
Gerald E. Adams

Gerald used CoCo Max III to illustrate this graphic scene. He is retired and lives in Bremen, Indiana.



2nd

Multichromatic Spheres
Mark Sexton

Mark, of Madera, California, used BASIC and the CoCo 3 for this interesting graphic, then compressed it with an ML program he developed. He is a senior in high school and is fascinated with graphic arts.

We are taking "CoCo Gallery"
to RAINBOWfest Princeton!
See Page 117 for details.

SHOWCASE YOUR BEST! You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is not an original work.

We will award two first prizes of \$25, one for the CoCo 3 and one for the CoCo 1 and 2; one second prize of \$15 and one third prize of \$10. Honorable Mentions may also be given.

Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

— Angela Kapfhammer, Curator



3rd

**Dragon's Lair,
Dragon Slayer**
Keith Schuler

Using the CoCo 3 and a program he wrote, Keith developed this depiction of a mythological battle. He enjoys drawing, swimming and using his CoCo.



HONORABLE MENTION

Independence Hall
Brad Bansner

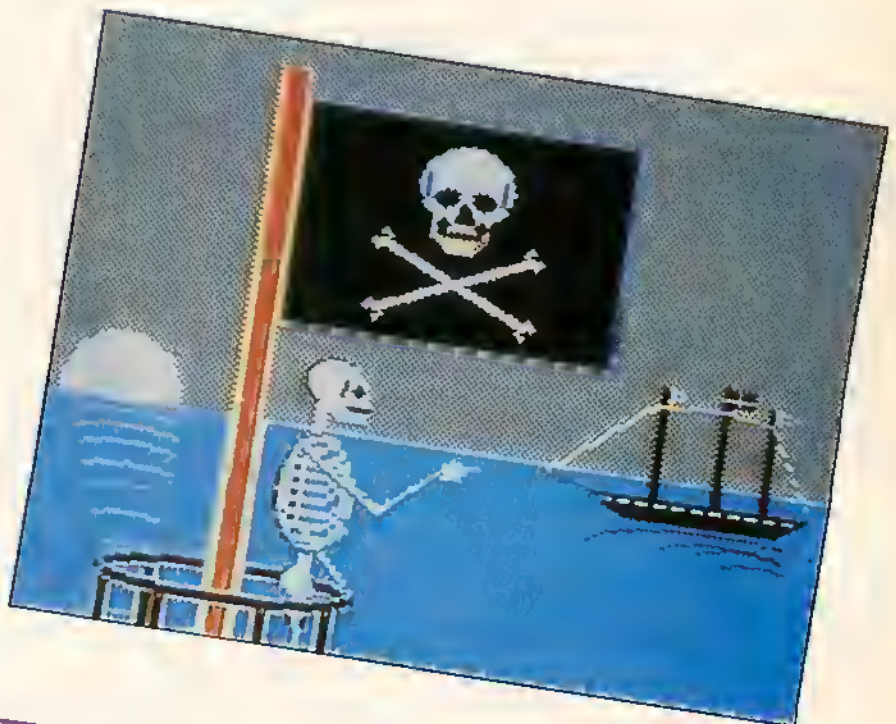
Brad, of Wyomissing, Pennsylvania, used Color Max Deluxe to create this illustration of Independence Hall, located in Philadelphia.

1st

COCO 1 & 2

Pirate
Bill & Bob Flock

BASIC and the CoCo 2 were used to develop this depiction. Brothers Bill and Bob live in Norwalk, Wisconsin, and enjoy working with computers and programming in BASIC.

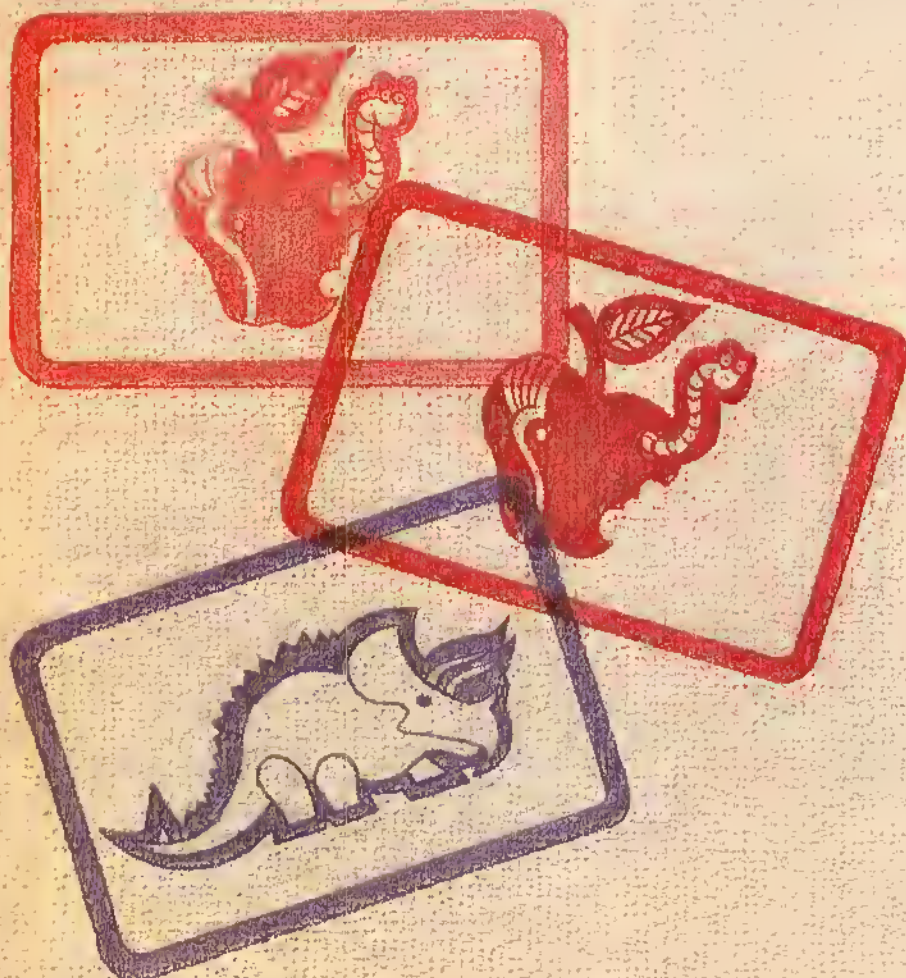


Two new graphics commands for
PMODE image manipulation.

Super Stamper:

The Elastic Rubber Graphics Stamp

By Jeremy Spiller



Take a graphics picture and stretch it, shrink it, turn it upside down and inside out. Enlarge it, rotate it, skew it and distort it. Print it all over your TV screen as many times as you want. Each time you do, one simple command can make it as large, small, distorted or rotated as you like. *Super Stamper* allows you to do all this.

SuperStamper is a graphics tool for use with PMODE 3 or 4 screens, similar to the GET and PUT statements but with several sizable differences. It is a machine language program that can easily become a part of BASIC in your 64K CoCo 1 or 2, or in your CoCo 3.

SuperStamper adds two new commands to BASIC—SGET and SPUT. They do not replace BASIC's GET and PUT statements, but operate alongside them. They live in high memory and do *not* take up any of the memory BASIC uses for programming and data. Unlike GET and PUT, SGET and SPUT do not require that you dimension an array to store what you SGET; this saves valuable memory for your program.

Jeremy Spiller, a high school senior, has been programming since age 12. He is now selling his programs as GoSub Software.

Telewriter-128™

the Color Computer 3 Word Processor

For over 5 years now, Telewriter has been the #1 Color Computer word processor, both in popularity and in performance. Telewriter's near perfect mix of sophisticated professional features and a very natural user interface, has earned it the highest praise in numerous magazines, and an intensely loyal following among tens of thousands of Color Computer users all over the world.

HISTORY

Throughout the history of the Color Computer, Telewriter has pioneered software breakthroughs that set the standards.

In 1981, it was Telewriter 1.0 that first took the Color Computer's inadequate 32X16 all-uppercase display, and replaced it with a graphics-based 51X24 upper and lowercase display.

A few years later, Telewriter-64 added high density 64X24 and 85X24 displays and access to the full 64K of the newer Color Computers.

THE NEW AGE

Today, Telewriter-64 is recognized as the standard Color Computer word processor. It runs on all Tandy Color Computers — from the original Color Computer 1, to the Color Computer 2, and 3.

But the Color Computer 3 brings a whole new level of power to low cost computing and, so, a new Telewriter is here to put that power to work for you. We call it Telewriter-128.

TELEWRITER-128

You don't mess with a good thing, so Telewriter-128 is still Telewriter-64 at heart. The commands, and the user interface are essentially the same. If you know Telewriter-64, then you already know Telewriter-128. And, if you don't know Telewriter-64, you'll still have an easy time learning and using Telewriter-128.

80 COLUMNS

But there are major differences as well. First, Telewriter-128 uses the Color Computer 3's new 80 column screen display.

This means, simply, that using Telewriter-128 on a low cost Color Computer 3 will look a lot like using a more expensive word processor on a much more expensive IBM PC, PS/2, or clone.

SPEED

Second, Telewriter-128 is lightning fast. Telewriter-64 was fast in its own right, but, by accessing the Color Computer 3's video hardware directly, and by running the machine in double speed mode, Telewriter-128 is able to provide extremely fast scrolling and instant paging — functions whose speed is crucial to serious word processing.

In this department, Telewriter-128 doesn't simply keep up with IBM-based word processors — it generally surpasses them!

EASE

Third, Telewriter-128 adds a host of new features big and small, that make it even easier to use.

Features like: Quick function key access to the editor or the menus — an instant on-line help screen summarizing all Telewriter commands and special characters — an option file where you store your personal set of format and screen settings so you only have to set them once!

Then, there's a quick save feature which allows you to save all your current work without leaving the editor. There's a simple way to cursor through the disk directory and read in a file by just hitting ENTER. And there's more.

NEW POWER

Telewriter-64 always had the power to handle any kind of serious writing, from letters to textbooks. But, here too, Telewriter-128 adds major features.

Like Macros — which let you insert whole words or phrases (even sets of control codes or format commands) into your text, with a single keypress. And every time you power up Telewriter-128, the macro definitions are automatically loaded*, so they're always there.

Then there's a Print Preview feature that shows you, on-screen, the way your printed text will look — with margins, headers, centering, justification, page numbering, and page breaks. This guarantees letter perfect documents every time, and makes tasks like widow/orphan line elimination, a breeze.

TELEWRITER-64 OR TELEWRITER-128

We could go on listing features, but the point is this: If you own a Color Computer, you already have the hardware for the most powerful, low cost word processor in town. All you need now is to add the heart and soul:

Telewriter-64, for the Color Computer 1 and 2, costs \$59.95 on disk, \$49.95 on cassette.

Telewriter-128 for the Color Computer 3 costs \$79.95 on disk, \$69.95 on cassette.

To order by Mastercard or Visa call (619) 755-1258 anytime, or send check or money order plus \$2 shipping (Californians add 6% sales tax) to:

COGNITEC

704 Nob Ave.

Del Mar, CA 92014

To upgrade from Telewriter-64 to Telewriter-128, return your original disk or cassette with \$39.95. (Add \$10 if you're also upgrading from cassette to disk. Deduct \$10 with proof of Oct '87 - Feb '88, purchase of Telewriter-64.)

When I first got Telewriter-64 last year, I was in heaven. I couldn't believe the program's versatility and ease of use.

—The RAINBOW, Oct. 1985

TELEWRITER-64 FEATURES: Compatibility with any printer that works with the Color Computer; embedded control codes for underlining, boldface, sub/superscript, variable fonts; format commands for headers, centering, margin and spacing changes anywhere in the document; Format menu to set margins, spacing, page numbering, BAUD rate, lines per page, justification; Chain printing for one shot printing of multi-file documents. Fast, full-screen editor with wordwrap, block copy/move/delete, global search and replace, wild card search, fast 4-way auto-repeat cursor, fast scrolling, forward and backward paging, text alignment, tabs, error protection, word and line number. Insert or delete text anywhere on the screen. Simple, easy to remember commands. Optional ASCII files for compatibility with spell checkers, terminal programs,

and BASIC. Load, save, append, partial save files to disk or cassette. Kill, rename and list disk files. Cassette verify and auto-retry on error.

TELEWRITER-128 - ADDITIONAL FEATURES: Print preview from editor; multiple copy print; footers; hanging indents; cursor thru disk directory to load, append, rename and kill files; quick file save from editor; keyclick; key repeat; true block move; 24, 35, or 28 line screen; 40 or 80 column screen; dual speed cursor; on-line help; overstrike mode; word delete; wordwrap at margin; user definable macros; nested macros; instant status window for information on cursor position, word count, etc.; instant function key access to menus or editor; options menu for setting character and screen colors, key repeat and delay rates, definable foreign symbols.



ed, *SuperStamper* remains BASIC until you reset or the computer. It will not hines without Extended r memory less than 64K.

works only on PMODE 3 or 4 screens and does not work on the high resolution screens of the Color Computer 3. However, CoCo 3 owners can still use *SuperStamper* on their PMODE 3 or 4 screens (provided they switch to CoCo 2 mode — more on this later).

How It Works

Like the GET and PUT commands, SGET and SPUT allow you to specify a rectangle on your graphics screen for storage. Unlike the GET and PUT commands, however, SGET and SPUT allow you to specify three points instead of two. This turns the rectangle into a true parallelogram.

A parallelogram is a four-sided figure in which opposite sides are parallel. Squares and rectangles are special kinds of parallelograms, having right angles at the corners; but the corners don't have to be right angles in order for the opposite sides to remain parallel. By "SGETting" a piece of your graphics screen in a rectangular parallelogram and then "SPUTting" it in a parallelogram of another size, shape and orientation, you can distort, invert, shrink, enlarge or rotate whatever graphic elements were in the original parallelogram.

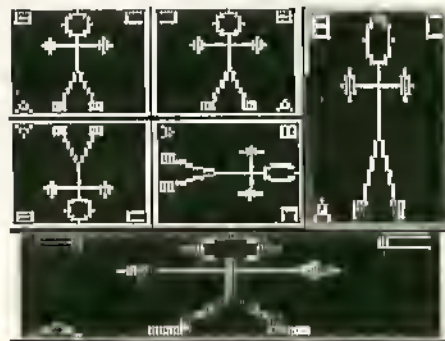
SuperStamper performs a beautiful mathematical ballet that recalculates the position of every pixel within your SGET parallelogram, and with SPUT, distorts the picture just as if it were made of rubber. The program is made even more versatile by its facility to lengthen or shorten the sides of the parallelogram, thereby enlarging or shrinking the picture.

You can shorten a picture in one dimension while elongating it in the other, giving the image a stretched appearance. Finally, you can rotate your parallelogram so that objects appear right-side-up, upside-down — or any rotational angle in between.

Once you have used the SGET command to specify your graphics parallelogram, you may stamp it all over the screen as many times as you want, using a newly defined parallelogram each time you SPUT it. With this stamping feature, you can draw a small picture in one part of the screen and use that picture to create many screenfuls of striking images. And because SGET and SPUT are compatible with all aspects of

BASIC, you can use *SuperStamper* as part of any BASIC graphics program.

SuperStamper allows you to SGET any part of your PMODE 3 or 4 screen up to 256 pixels wide by up to 128 pixels deep. Any attempt to SGET or SPUT with larger numbers will give unexpected results.



Usage Syntax

The syntax for using SGET and SPUT in your BASIC statements is as follows:

```
SGET (AX,AY)-(BX,BY)-(CX,CY)
SPUT (AX,AY)-(BX,BY)-(CX,CY)
```

X specifies the horizontal position of each of the three points that define the parallelogram — a number from 0 to 255; 0 is on the left side of the screen.

Y specifies the vertical position of each of the three points — a number from 0 to 191; 0 is at the top of the screen, and 191 is at the bottom. AX,AY specifies the position of Point A. BX,BY specifies the position of Point B. CX,CY specifies the position of Point C.

Note that you do *not* have to specify an array or an action as you do in the GET and PUT commands. *SuperStamper* uses its own secret array hidden away in high memory, so you won't have to sacrifice any memory that would otherwise be used for your own program.

The SGET command will "lasso" any part of your graphics picture by drawing an imaginary parallelogram around it. The three arguments that follow SGET specify the three points on the screen that define the parallelogram:

```
SGET (Point A)-(Point B)-(Point C).
```

The computer always draws four imaginary lines. The first is drawn between points A and B, and the second between points B and C. These two lines define the parallelogram. The other two imaginary lines are drawn opposite and parallel to the first two so as to complete the parallelogram. They meet at imaginary Point D, which is always diagonally across from Point B. (Note that *no*

line is drawn between points A and C.)

You may choose any shape parallelogram for "SGETting;" however, in most cases you will probably want to define a rectangle, as it is the easiest shape to keep track of. Once you have defined your SGET parallelogram, the computer copies it into a secret buffer where it is stored in a "standard" form for later stamping with the SPUT command.

SPUT has the same syntax as SGET. The first pair of coordinates following the SPUT define Point A; the second pair define Point B; and the third, Point C. The main thing to remember when using SPUT is that graphics elements that were near any given point when you defined your SGET parallelogram always remain near that point no matter where they are SPUT. For example, let's say you have a picture of a man with his arms and legs outstretched. His right hand is gloved and his left is not. You SGET him by specifying Point A near his right foot (the lower-left corner of the SGET rectangle); Point B near his right hand (the upper-left corner of the rectangle) and Point C near his left hand (the upper-right corner of the rectangle). Now you can stamp him with the SPUT command. If you specify Point A (the first pair of coordinates following the SPUT command) to be the upper-left corner of your SPUT rectangle, leaving points B and C to be the lower-left and lower-right corners, respectively, your man will appear upside down and backwards (inverted), just as if he were viewed in a mirror placed under his feet. His left hand now wears the glove instead of his right hand (see the figure for a screen dump of Listing 2's demo).

You can elongate your stick figure by specifying SPUT points farther apart than they were in the original SGET command. You could elongate him right to left while shortening him up and down. You can rotate him by having three points draw a non-vertical line between points A and B, and specifying a line between points B and C at a right angle to the line between points A and B. You can skew him by making Line AB non-vertical, but keeping line BC horizontal. And, of course, you can stamp him with no distortion at all.

Keying In for CoCo 3

Before trying to key in or run *SuperStamper* on a CoCo 3, you must put it into CoCo 2 mode by typing the following lines:

```
10 POKE &HFFDE,0
20 POKE 113,0
30 EXEC 40999
```

Program Organization

Listing 1 is the utility that boots the *SuperStamper* algorithm. It should be saved under the filename SUPRSTMP.BAS. Its function is twofold. First, it transfers the ROM into the all-RAM mode and installs the *SuperStamper* algorithm into the BASIC interpreter, giving it the ability to understand the SGET and SPUT commands. Second, it gives birth to a machine language "clone" of itself that can be saved to disk or tape and later reloaded to perform the same functions, only much faster.

Lines 1000 through 1170 contain the algorithm itself. *Every character in these lines must be correct or SuperStamper will not work.* For this reason, I have included check sums so the computer can tell you if you have made an error. Do not renumber these lines!

The DATA lines do not contain the letter 'O'! They do, however, contain many zeros! If you get an error message when running the program, check to see if you have included an 'O' instead of a zero. It is helpful to know that these lines contain only the digits 0 through 9 and the letters A through F and that all the lines are the same length except for Line 1170.

The ML Clone

When executed, the ML clone transfers the computer into the all-RAM mode and installs the algorithm. Note that the ML clone is *not* the same program you keyed in; it is created by SUPRSTMP and lives in a special place in high memory protected from BASIC by Line 70 (CLEAR200,&H7E00). After creating the ML clone, SUPRSTMP will prompt you for a save to disk or tape. When you answer the prompt, the clone will be saved as STAMP.BIN. Once saved, you may install *SuperStamper* very quickly by loading and executing STAMP.BIN. You *must* use the following boot to load and execute:

```
10 CLEAR 200,&H7E00
20 LOADM"STAMP"
   (CLOADM for tape users)
30 EXEC
40 CLEAR 200,&H7FFF
```

Note that you cannot key in or run any program that contains SPUT or SGET unless you have first installed the *SuperStamper* algorithm by either running SUPRSTMP or by executing STAMP.BIN. The computer cannot understand the syntax of SPUT or SGET

unless the operating system has been properly modified. The demo is no exception. Therefore, key in SUPRSTMP first and create an easily accessible copy of STAMP.BIN before beginning work on the demo.

It is important to your understanding of the program that you key in and study Listing 2. The listing is very much a part of the documentation for *SuperStamper* and a graphic demonstration of what happens when you relocate points A, B and C. It contains examples of how to create mirror images and skewed, stretched, inverted and rotated stampings.

The REM statements attached to each SPUT line explain what it does. The important thing to note is not the exact location of each point, but the *relative* position of points A, B and C in each SPUT statement.

The SGET is always done in a rectangle with Point A in the lower-left corner, Point B in the upper-left and C in the upper-right. If your SPUT statement places Point A in the lower-right corner, Point B in the upper-right and Point C in the upper-left, you get a mirror image (see Line 540). If you leave Point A at the lower-left, but displace points B and

HELLO/BAS

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C to the right, your graphics will be skewed in that direction. The box around the stick figure is 80 pixels wide and 60 pixels high. Note that in some of the lines I have allowed BASIC to add these dimensions right inside the parentheses. The term (0,65+60) is the same as (0,125).

You can use any numerical expression or variable inside the parentheses.

Program Quirks

Keep in mind that you are working

with digitalized images whose resolution depends upon the exact size and location of each pixel. Whenever you shrink an image using *SuperStamper*, you will lose some detail. Because each pixel is longer up and down than it is right to left, rotations will produce some distortion that you may be able to minimize by adjusting the exact size and position of each SPUT point.

You may be surprised at some of your results. When you skew a picture, you may find that it wraps around to the

opposite side of the screen or is partly off the screen because you inadvertently placed Point D (the last corner of the parallelogram that you *didn't* specify in your SPUT statement) outside the 256-by-128 pixel limit.

(Questions or comments regarding these programs may be directed to the author at P.O. Box 1094, Townsend, MA 01469. Please enclose an SASE when writing for a reply.) □

✓	180	.....1
	330	.....56
	1080	.....34
	END	.....250

Listing 1: SUPRSTMP

```

5 REM COCO 3 USERS MUST SWITCH
  TO COCO 2 MODE BEFORE KEY-
  ING IN OR RUNNING THIS
  PROGRAM. TYPE
  POKE&HFFDE,0:POKE113,0:
  EXEC&HA027
10 REM *****
20 REM *      SUPERSTAMPER      *
30 REM *      BY                *
40 REM *      JEREMY SPILLER    *
50 REM *      COPYRIGHT 1988    *
60 REM *****
70 CLEAR 1000,&H7E00
80 PO=&H7E00
90 FOR X=17 TO 0 STEP -1
100 CLS:PRINT "COUNTDOWN =";X
110 PRINT "LINE";(17-X)*10+1000
120 READ A$:CS=0
130 FOR Y=1 TO LEN(A$)-3 STEP 2:
  A=VAL("&H"+MID$(A$,Y,2)):POKE PO
  ,A:PO=PO+1:CS=CS+A:NEXT Y
140 IF RIGHT$(HEX$(CS),3)<>RIGHT
$(A$,3) THEN PRINT"ERROR":STOP
150 NEXT X
160 EXEC &H7E00
170 CLS:PRINT"SUPERSTAMPER HAS N
OW BEEN IN-   STALLED AS A PART
OF BASIC":PRINT
180 PRINT"IT HAS ALSO BEEN STORE
D IN         MEMORY AS A MACHINE LA
NGUAGE      CLONE WHICH CAN BE SAV
ED TO DISKOR TAPE.  ONCE SAVED,
THIS CLONEMAY BE USED TO INSTALL
SUPER-      STAMPER WITHOUT RUNNIN
G           SUPRSTMP.BAS.
190 PRINT:LINE INPUT"PLEASE PREP

```

```

ARE DEVICE AND PRESS (D)ISK OR (
T)APE AND (ENTER)      WHEN READY.
YOU MAY ALSO PRESS (BREAK) TO
QUIT." ;A$
200 IF A$="D" THEN SAVEM"STAMP.B
IN",&H7E00,&H7FB8,&H7E00 ELSE IF
A$="T" THEN GOSUB 330 ELSE 180
210 PRINT
220 CLS
230 PRINT"TO INSTALL SUPER STAMP
, PLACE THIS AT THE BEGINING O
F YOUR PROGRAMS:"
240 PRINT
250 PRINT"10 CLEAR 200,&H7E00"
260 PRINT"20 ";
270 IF A$="T" THEN PRINT"C";
280 PRINT "LOADM"+CHR$(34);
290 PRINT"STAMP"+CHR$(34)
300 PRINT "30 EXEC"
310 PRINT "40 CLEAR 200,&H7FFF"
320 CLEAR 1000,&H7FFF:END
330 CSAVEM"STAMP.BIN",&H7E00,&H7
FB8,&H7E00:RETURN
340 REM THE FOLLOWING DATA
CONTAINS ONLY ZEROS, NO
LETTER "OH"'S
1000 DATA 1A508E8000A6846384A184
27036384397FFFDEEC847FFDFEDD0E
1010 DATA 818CE00025F18E013E8602
A780CCE015ED81C621ED81C6066FC3E
1020 DATA 805A26FB8EE015338D000E
C6C010AEC110AF815A26F71CAF39B0C
1030 DATA 534745D4535055D4E0A6E0
7E80E28EE01D7EADD49602D604DDD9E
1040 DATA 008EE0028D038EE00B6F01
6F03E604E0841D58ED04E606E0029DD
1050 DATA 1D58ED068680A708399602
D604DD008EE0028D1426F28EE00BA47
1060 DATA 8D0D960BD60D9702D70486
80970A39EC04E384ED84EC06E302B11
1070 DATA ED026A0839170098A6C08D
128D108D0E8D0C1183F18525F04F98D
1080 DATA 1F8B1CAF395F46594659D7
1434028D2B8DAC35828D718D148D940
1090 DATA 128D108D0EA7C01183F185
25F04F1F8B1CAF3934028D378D8C9E0

```

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```

110 DATA 350208144608144639DC00
C1C024F91E8958445644564456F386E
111 DATA 00BA1F02D600C403041459
041459588EE165A6A43AAA80A48495C
112 DATA A7A439DC001E8958445644
564456F300BA1F02E6A4960084039A2
113 DATA 270548584A26FCD714398D
33B7E00FF7E0118D3C8D29B7E00BACB

```

```

114 DATA F7E00DB7E002F7E0048D2C
8D19B7E006F7E0081A507FFF4086CE1
115 DATA E01F8BCEE18517FEDF397E
B277BDB26ABDB7343404BDB26735D56
116 DATA 04962C4439C6ACBDB26F39
003F80BF407FC0FF00CF20EF10DFB95
117 DATA 30FF00F308FB04F70CFF00
FC02FE01FD03FF204D994

```

✓	120	.....	110	530	.....	3
	250	.....	153	640	.....	107
	350	.....	188	END	.....	11

Listing 2: STMPDEMO

```

5 REM COCO 3 USERS MUST SWITCH
  TO COCO 2 MODE BEFORE KEY-
  ING THIS PROGRAM IN. TYPE
  POKE&HFFDE,0:POKE113,0:
  EXEC&HA027
8 REM BEFORE KEYING THIS LISTING
  INTO YOUR COCO, THE SUPER-
  STAMPER ALGORITHM MUST BE
  RESIDENT. YOU MAY DO THIS
  BY FIRST RUNNING LISTING
  #1 (SUPRSTMP.BAS), OR BY
  EXECUTING THE ML CLONE
  (STAMP.BIN)
20 REM FAILURE TO DO THIS WILL
   RESULT IN SYNTAX ERRORS
   AND NONSENSE LISTINGS!
30 CLEAR 1000, &H7E00
40 REM *****
50 REM * SUPERSTAMPER DEMO *
60 REM * BY *
70 REM * JEREMY SPILLER *

```

```

80 REM * COPYRIGHT 1988 *
90 REM *****
100 CLS:PRINT"IN ORDER TO RUN AN
Y PROGRAM WHICH USES 'SGET'
OR 'SPUT', YOU MUST FIRST INS
TALL THE SUPERSTAMPER ALGOR
ITHM BY EITHER RUNNING SUPRSTMP.B
AS OR BY EXECUTING STAMP.BI
N."
110 PRINT
120 LINE INPUT"PLEASE PREPARE YO
UR DEVICE AND INPUT (T)APE OR (
D)ISK TO LOAD AND EXECUTE STAMP
.BIN, OR (A)BORT IF YOU HA
VE ALREADY RUN SUPRSTMP.BAS.
";A$
130 IF A$="T" THEN CLOADM"STAMP.
BIN"ELSE IF A$="D"THEN LOADM"STA
MP.BIN"ELSE GOTO 150
140 EXEC:GOTO 160
150 IF A$="A"THEN GOTO 160 ELSE
GOTO 100
160 PRINT:PRINT STRING$(31,"-"):
INPUT"CAN YOUR TV SUPORT ARTIFIC
IAL COLORS (Y/N)";A$:IF A$="Y"
THEN PMODE 4,1:SCREEN 1,1:PMODE
3,1 ELSE IF A$="N" THEN PMODE 3
,1:SCREEN 1,0 ELSE 160
170 PCLS
180 S$="R6;U3;L6;U3;R6;BD6;BR4"
190 P$="U6;R6;D3;L6;BR6;BD3;BR4"
200 R$="U6;R6;D3;L6;M+6,+3;BR4"
210 M$="U6;M+4,+6;M+4,-6;D6;BR4"
220 L$="U6;BD6;R6;BR4"
230 E$="U6;R6;BD3;L6;BD3;R6;BR4"
240 Y$="BR4;U3;M-3,-3;BR7;M-4,+3
;BD3;BR7"
250 DRAW"BM74,12"+S$+";U6;BD6;R6
;U6;BR4;BD6"+P$+E$+R$
260 DRAW S$+"BR4;U6;BL3;R8;BD6;B
R3;U6;R6;D6;BU3;L6;BD3;BR11"+M$+
P$+E$+R$
270 DRAW"BM124,22;L6;U6;R6;D6;BU
3;L6;BD3;BR10"+Y$
280 DRAW"BM99,30;D3;R6;U6;BR3;BD
6"+E$+R$+E$+M$+Y$
290 DRAW"BM99,44"+S$+P$+"U6;BR6;
BD6"+L$+L$+E$+R$
300 SGET(74,13)-(74,5)-(200,5):R
EM GETS THE WORD "SUPERSTAMPER"

```

Mouse Tales

By Logan Ward



```

310 SPUT(0,85)-(20,65)-(250,65):
REM STAMPS WORD ELONGATED & SKEW
ED
320 SPUT(0,90)-(20,110)-(250,110
):REM STAMPS WORD UPSIDEDOWN &BA
CKWARD (INVERTED) AND ELONGATED
& SKEWED
330 SGET(97,46)-(97,16)-(166,16)
340 SPUT(50,190)-(50,110)-(220,1
10)
350 GOSUB 670
360 REM DRAWS FIGURE IN BOX
370 PCLS:LINE(88,125)-(168,65),P
SET,B
380 DRAW"C2BM92,123;M+4,-6;M+4,+
6;BM-2,-2;L2"
390 DRAW "BM92,67;D6;R8;U6;L8;BD
3;R8"
400 DRAW"BM164,67;L8;D6;R8"
410 DRAW"BM128,82;D18;M-10,+20;B
R20;M-10,-20"
420 CIRCLE(128,74),8
430 LINE(114,86)-(142,86),PSET
440 CIRCLE(112,86),4,2
450 PAINT (112,86),2,2
460 CIRCLE(144,86),4,3
470 PAINT(144,86),3,3
480 LINE(114,122)-(120,118),PSET
,BF
490 COLOR3
500 LINE(136,122)-(142,118),PSET
,BF
510 SGET(88,126)-(88,65)-(170,65
):REM GETS STICK FIGURE
520 PCLS
530 SPUT(0,62)-(0,0)-(82,0):REM
NO DISTORTION
540 SPUT(168,62)-(168,0)-(84,0):
REM STAMPS AS MIRROR IMAGE
550 SPUT(0,65)-(0,65+60)-(82,65+
60):REM INVERTED (UPSIDEDOWN & B
ACKWARDS)
555 SPUT(84,65)-(168,65)-(168,12
6):REM SIDEWAYS (90 DEGREE ROTAT
ION)
560 SPUT(0,191)-(0,129)-(255,129
):REM ELONGATED RIGHT-LEFT
570 SPUT(172,127)-(172,0)-(255,0
):REM ELONGATED UP-DOWN
580 REM THE FOLLOWING DEMONSTRAT
ES SKEWING (TILTING) & ROTATION
590 GOSUB 670:PCLS:SPUT(0,127)-
(0,0)-(255,0):REM ENLARGED ONLY
600 GOSUB 670:PCLS:SPUT(0,127)-
(50,0)-(255,0):REM ENLARGED & SL
IGHT SKEW
610 GOSUB 670:PCLS:SPUT(0,127)-
(128,0)-(255,0):REM ENLARGED & LA
RGER SKEW
620 GOSUB 670:PCLS:SPUT(200,0)-
(200,127)-(0,127):REM 180 DEGREE

```

```

ROTATION (UPSIDEDOWN)
630 GOSUB 670:PCLS:SPUT(128,50)-
(190,110)-(128,160):REM 135 DEGR
EE ROTATION
640 GOSUB 670:PCLS:SPUT(42,95)-
(170,31)-(212,95):REM ELONGATED &
45 DEGREE ROTATION
650 SOUND 150,5:SOUND 100,10
660 GOSUB 670:GOTO 680
670 FOR X=220 TO 255:SOUND X,1:N
EXT:RETURN
680 CLS:PRINT"NOW YOU MAY TRY IN
SERTING YOUR OWN POINTS A, B AN
D C. YOU DO NOT NEED PARENTHESES.
TYPE THE X AND Y COORDINATE
S SEPARATED BYA COMMA. REMEMBER
THAT THE TOTAL HEIGHT CANNOT
EXCEED 128 PIXELS":PRINT
690 PRINT"EXAMPLE AX,AY ? 0,127"
:PRINT
700 INPUT"AX,AY";AX,AY
710 INPUT"BX,BY";BX,BY
720 INPUT"CX,CY";CX,CY
725 IF A$="N"THEN PMODE 3,1:SCRE
EN 1,0 ELSE IF A$="Y"THEN PMODE
4,1:SCREEN 1,1:PMODE 3,1
730 PCLS:SPUT(AX,AY)-(BX,BY)-(CX
,CY)
740 GOSUB 670:GOTO 680

```

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PCDIR	directory of PC disk	RSDIR	directory of RSDOS disk
PCDUMP	display PC disk sector	RSDUMP	display RSDOS disk sector
PCREAD	read PC file	RSREAD	read file from RSDOS disk
PCWRITE	write file to PC disk	RSWRITE	write file to RSDOS disk
PCRENAME	rename PC file	FLEXDIR	directory of FLEX disk
PCDELETE	delete PC file	FLEXDUMP	display FLEX disk sector
PCFORMAT	format PC disk	FLEXREAD	read FLEX file
		FLEXWRITE	write file to FLEX disk

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- * Programmable Printer rates from 110 to 9600 baud.
- * Send Files directly from the Buffer, Macro Keys or Disk.
- * Display on Screen or Print the contents of the Buffer.
- * Freeze Display & Review information On Line with no data loss.
- * Built in Command Menu (Help) Display.
- * Built in 2 Drive Ramdisk for 512K RAM support and much more.

Supports: R.S. Modem-Pak & Deluxe RS-232 Pak, even with Disk.

Requires 128K & Disk, \$59.95

EDT/ASM III

128/512K DISK EDITOR ASSEMBLER

EDT/ASM III is a Disk based co-resident Text Editor & Assembler. It is designed to take advantage of the new features available in the CoCo-3 with either 128K or 512K of memory. It has 8 display formats from 32/40/64/80 columns by 24 lines in 192 or 225 Resolution, so you see the best display mode whether you are using an RGB or Composite monitor or even a TV for your display. Plus you can select any foreground or background colors or even monochrome display modes. It will even support 512K by adding an automatic 2 drive Ultra Fast Ramdisk for lightning fast assembly of program source code larger than memory. There is also a free standing ML Debug Monitor, to help you debug your assembled programs. EDT/ASM III has the most powerful, easy to use Text Editor available in any Editor/Assembler package for the Color Computer.

- * Supports Local and Global string search and/or replace.
- * Full Screen line editing with immediate line update.
- * Easy to use Single keystroke editing commands.
- * Load & Save standard ASCII formatted file formats.
- * Block Move & Copy, Insert, Delete, Overtyping.
- * Create and Edit files larger than memory.
- * The Assembler portion of EDT/ASM III features include:
- * Supports the full 6809 instruction set & cross assembles 6800 code.
- * Supports Conditional IF/THEN/ELSE assembly.
- * Supports Disk Library file (includes) up to 9 levels deep.
- * Supports standard Motorola assembler directives.
- * Allows multiple values for FCB & FDB directives (unlike R.S. EDT/ASM).
- * Allows assembly from the Editor Buffer, Disk or both.

Requires 128K & Disk \$59.95

TEXTPRO IV

"The ADVANCED COCO-3 Word Processing System"

- * 9 Hi-Res Displays from 58 to 212 columns by 24 lines in 225 Res.
- * On Screen Display of Bold, Italic, Underline & Double Width print.
- * Up to 8 Proportional Character Sets Supported with Justification.
- * Up to 80 Programmable Function Keys & Loadable Function key sets.
- * Fully Buffered keyboard accepts data even during disk access.
- * Antioxxecute Startup files for easy printer & system configuration.
- * 8 Pre-Defined Printer function commands & 10 Programmable ones.
- * Supports Library files for unlimited printing & configurations.
- * Disk file record access for Mail Merge & Boiler Plate printing.
- * Completely Automatic Justification, Centering, Flush left & right.
- * Change indents, margins, line length, etc. anytime in the text.
- * Create and Edit files larger than memory, up to a full disk.
- * Easily imbed any number of printer format and control codes.
- * Built in Ultra Fast 2 drive RAMDISK for 512K support.

TEXTPRO IV is the most advanced word processing system available for the COCO-3, designed for speed, flexibility and extensive document processing. It is not like most of the other word processing programs available for the Color Computer. If you are looking for a simple word processor to write letters or other short documents, and never expect to use multiple fonts or proportional spacing, then most likely you'll be better off with one of the other simpler word processors. But, if you want a powerful word processor with extensive document formatting features to handle large documents, term papers, manuals, complex formatting problems and letter writing, then TEXTPRO IV is what you're looking for. It works in a totally different way than most word processing programs. It uses simple 2 character abbreviations of words or phrases for commands and formatting information that you imbed directly in your text. There are over 70 different formatting commands you can use without ever leaving the text you're working on. There are no time consuming, and often frustrating menu chases, you're in total control all times. You can see what the formatted document will look like before a single word is ever printed on your printer. Including margins, headers, footers, page numbers, page breaks, column formatting, justification, and Bold, Italic, Underline, Double Width, Superscript and Subscript characters right on the screen.

TEXTPRO IV can even support LASER PRINTERS with proportional fonts, take a good look at this AD? It was done with TEXTPRO IV on an OKIDATA LASERLINE-6 laser printer!!! All the character sets used on this AD are proportional spaced characters, all centering, justification, and text printing was performed automatically by TEXTPRO IV.

Requires 128K & Disk \$89.95

HI-RES III Screen Commander

The DISPLAY you wanted but didn't get on your CoCo-3

- * 54 Different Character Sizes available from 14 to 213 epl.
- * Bold, Italic, Underline, Subscript, Superscript and Plain character styles.
- * Double Width, Double Height and Quad width characters.
- * Scroll Protect form 1 to 23 lines on the screen.
- * Mixed Text & Graphics in HSCREEN 3 mode.
- * PRINT @ is available in all character sizes & styles.
- * Programmable Automatic Key repeat for fast editing.
- * Full Control Code Keyboard supported.
- * Selectable Character & Background color.
- * Uses only 4K of Extended (2nd 64K) or Basic RAM.
- * Written in Ultra Fast Machine Language.

HI-RES III will improve the standard display capabilities of the Color Computer 3, even the 40 and 80 column displays have several features missing. For example, you can't use PRINT @ or have different character sizes on the same screen, even when mixing text and graphics with the HPRINT command. HI-RES III can give you the kind of display you always dreamed about having on your CoCo-3, with a wide variety of display options that you can easily use with your Basic or ML programs.

HI-RES III is totally compatible with Enhanced Color Basic and its operation is invisible to Basic. It simply replaces the normal screen display with an extremely versatile display package. With the full control code keyboard, you can control many of HI-RES III extended functions with just a couple of simple keystrokes.

Requires 128K Tape or Disk \$34.95

512K RAMDISK & MEMORY TESTER

RAMDISK is an ALL Machine Language program that will give you 2 ULTRA High Speed Ram Disks in your CoCo-3. It does not need or require the OS-9 operating system. It works with R.S. DOS V1.0 or V1.1 and it is completely compatible with Enhanced Color Disk Basic! Plus it allows you to run at double speed all the time even for floppy disk access!!! It will not disappear when you press reset like some other ramdisk programs. The MEMORY tester is a fast ML program to test the 512K ram. It performs several bit tests as well as an address test so you know that your 512K of memory is working perfectly.

Requires 512K & Disk \$19.95

"The SOURCE III"

DISASSEMBLER & SOURCE CODE GENERATOR

The SOURCE III will allow you to easily Disassemble Color Computer machine language programs Directly from Disk and generate beautiful, Assembler compatible Source code.

- * Automatic label generation and allows specifying FCB, FDB and FCC areas.
- * Disassemble programs Directly from disk, unlike other disassemblers.
- * Automatically locates Begin, End and Execution address.
- * Output Disassembled listing with labels to the Printer, Screen or both.
- * Generates Assembler source files directly to disk or printer.
- * Built in Hex/Ascii dump/display to locate FCB, FCC & FDB areas.
- * 8 Selectable Display formats 32/40/64/80 columns in 192 or 225 Res.
- * Selectable Foreground & Background colors & Printer Baud rates.
- * Built in Disk Directory or Kill file commands.
- * Menu display with single key commands for smooth, Easy operation.
- * Written in Ultra Fast Machine Language.

Requires 128K & Disk \$49.95

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View FINDER Files

Program Keys Used
OPEN: ?CHRS

Delete Key
Display Keys
Save Keys
Load Keys

BUTTON
OPEN 255,7

DRIVE 1

ONHEMU1	BAS	0	0	2
CONFIG	BAS	0	0	2
CHECK	BAS	0	0	1
AUTOEXEC	BAS	0	0	1
CONFIG	SYS	1	1	1

DRIVE 3

Window Master Finder V1.0

Written by Bill Vergona
Copyright (c) 1988 by Cer-Comp Ltd

Window Master supports up to 54 different character sizes on the screen with 5 different character styles. You can have Bold, Italic, Underlined, Super-Script, Sub-script or Plain character styles or any combination of them in any character size. You can also change the text color and background at any time to get really colorful displays.

Window Master is fully compatible with Enhanced Color Disk basic with over 50 Commands & functions added to fully support the Point & Click Window System. Window Master does not take any memory away from Basic, so you still have all the Basic Program memory available.

WindowMaster uses the full potential of the Color Computer 3 display by using the 225 vertical resolution display modes instead of the 192 or 200 resolution modes like most other programs. It uses either the 320/16 color mode or the 640/4 color display to give you the best display resolution possible, and can be switched to either mode at any time.

Window Master fully supports both Text & Graphics displays and even has a Graphics Pen that can be used with HLINE, HCIRCLE, HSET and more. You can change the Pen width & depth and turn it on or off with simple commands. We also added Enhanced Graphics Attributes that allow graphics statements to use And, Or, Xor and Copy modes to display graphic information. With the Graphics enhancements added by Window Master, you could write a "COCOMAX" type program in Basic! In fact we provide a small graphics demo program written in Basic.

Window Master adds a powerful new programming feature to Basic that enables you to do "Real Time" Programming in Basic. It's called Event Trapping, and it allows a program to detect and respond to certain "events" as they occur. You can trap Dialog activity, Time passage, Menu Selections, Keyboard activity and Mouse Activity with simple On Gosub statements, and when the specified event occurs, program control is automatically routed to the event handling routine, just like a Basic Gosub. After servicing the event, the sub-routine executes a Return statement and the program resumes execution at the statement where the event occurred.

Window Master adds an enhanced editor to Basic that allows you to see what you edit. It allows you to insert & delete by character or word, move left or right a word or character at a time, move to begin or end of line, toggle automatic insert on/off or just type over to replace characters. The editor can also recall the last line entered or edited with a single key stroke. You can even change the line number in line to copy it to a new location in the program.

Window Master supports multiple window displays with up to a maximum of 31 windows on the screen. Overlapping windows are supported, and any window can be made active or brought to the top of the screen. Windows can be picked up and moved anywhere on the screen with the mouse. There are 6 different Window styles to choose from and the window text, border and background color is selectable.

Menus are completely programmable with up to 16 menus available. They can be added or deleted at any time in a program. Menu items can be enabled, disabled, checked or cleared easily under program control. Menu selection is automatically handled by Window Master & all you have to do is read a function variable to find out which menu was selected.

Each Window can have up to 128 buttons, icons or Edit fields active, if you can fit that many. Buttons, Icons and Edit field selection is handled automatically by Window Master when the mouse is clicked on one. All you have to do is read a Dialog function to find out which Button, Icon, or Edit field was selected, its very simple.

Window Master automatically handles the Mouse pointer movement, display and button clicks. It will tell you the current screen coordinate, the local window coordinate, window number the mouse is in, the number of times the button was pressed, which window number it was clicked in and more. The Keyboard is completely buffered, and supports up to 80 programmable Function keys that can contain any kind of information or command sequences you can imagine. You can load and save function key sets at any time. So, you can have special sets of function keys for different tasks. The 'Ctrl' key is supported so that you have a full control code keyboard available.

Window Master pushes the Color Computer 3 far beyond its normal capabilities, into the world of a "User Friendly" operating environment. We are already planning several new programs for use with Window Master. So you don't have to worry about having to write all your own programs. And don't forget that many existing Basic and M.L. programs will run under Window Master with little or no changes. The Possibilities for Application programs are endless: Spread Sheets, Word Processing, Communications, Education, Games, Graphic Design, Desk Top Publishing and on and on.

Window Master requires 512K of memory, at least 1 Disk Drive, a Hi-Res Joystick Interface and a Mouse or Joystick.

If you run into difficulty trying to use some of Window Master's features, we will be happy to assist you in any way possible. You can write to us at the address below or call us between 10am and 2pm Pacific Standard Time for a more timely response. Sorry, no collect calls will be accepted.

To order WINDOW MASTER by mail, send check or money order for \$69.95, plus \$3.00 for shipping & handling to the address below. To order by VISA, MASTERCARD or COD call us at (702)-452-0632
(Monday thru Saturday, 8am to 5pm PST)

5566 Ricochet Avenue
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Some Terms Defined

I've had my CoCo 2 for about a year now. Before that I knew very little about writing programs. Could you print a column on what PEEK, POKE, text, screen dump, HDRAW, HPRINT, DATA and SOUND mean. I need this information so I can become a better CoCo 2 user.

Chris Provence
Saranac, NY

R I can define those terms for you: PEEK is used to determine the value stored at an address in memory; e.g. PRINT PEEK(1463) will print the value stored at address 1463 in memory. The opposite of PEEK is POKE.

POKE is used to change the value stored at an address in memory; e.g. POKE 1463,2 changes the value stored at Address 1463 to two.

Text files are files comprised of ASCII values. ASCII is an industry-standard code for representing text (components of alphabetic and numeric strings) using one-byte values (eight bits stored at a single address). 'A' = 65, 'B' = 66, ... '0' = 48, '1' = 49, etc.

A screen dump is a printer's representation of what can be viewed on a computer's screen.

HDRAW, similar to the DRAW command on the CoCo 1, draws lines and boxes and works only with the newer Hi-Res modes on the CoCo 3.

HPRINT allows you to put text on a CoCo 3's Hi-Res screen.

DATA statements are used in conjunction with READ statements; e.g.:

```
10 READ X
20 DATA 23, 46, 55
```

The READ statement in Line 10 will pick up the value 23 for X. If another READ statement is encountered, it will use the value 46, etc.

The SOUND command is used to send audio effects to your TV speaker. SOUND 3,30 sends a low-pitched sound for 30 six-hundredths seconds.

Richard Esposito is the principal engineer for BDM Corporation. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.

Richard Libra is a simulator test operator for Singer Link Simulation Systems Division.

D O C T O R



A S C I I

By Richard E. Esposito
Rainbow Contributing Editor
with Richard W. Libra

A Good Deal

I have recently come across a super deal on IBM disk drives. They are the double-sided drives found on the discontinued IBM PCjr. Will these drives fit and work in the FD500 case? Also, can I use both sides of the drive from Disk BASIC, or just from OS-9? If I can't use both sides, will I be able to use one side of the drive?

Kent Signorini
Grimshaw, Alberta

R The IBM disk drive should fit the FD500 case and use your power supply, but you may need to modify your cable. SpectroSystem's ADOS or Burke & Burke's Hyper-IO can provide the double-sided capability.

CoCo 2 and 3 — Programs Don't Mix

I own a CoCo 2, Version 1, Release 1, with disk drive. Is there any way to get CoCo 3 programs to run on my machine?

Duane Shwartz
Merrill WI

R Unfortunately, no. CoCo 3-specific programs take advantage of its additional memory and unique hardware.

Problems With the Humidity

Whenever the humidity is high my CoCo 2 does not function properly. (I get a blank gray screen, and the ROM packs do not work.) I have no problems using my neighbor's computer in the same environment.

Steve Pawlowski
Elmont, NY

R There are environmental specifications associated with all electronic equipment. Tandy specs for the CoCo are as follows: temperature, 55 to 85 degrees Fahrenheit; and altitude, 100 to 6,000 feet. Some CoCos may operate outside these specs due to relative age, small differences in parts, manufacturing, etc. As long as your machine operates within the published specs, there is nothing wrong with it. As mentioned before, for many years air-conditioned environments were required to operate computers at all.

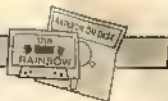
IBM Software on a CoCo

In past articles, readers have asked if IBM software could run on the CoCo. I have heard that it was possible to run Apple software on the Tandy 1000. If this is so, why couldn't something be made to run IBM software on the CoCo?

Jared Hawley
Honolulu, HA

R Granted, with Tandy's Trackstar 128 board installed in a Tandy 1000, you can run Apple II software; but it costs \$399 — twice the price of a CoCo 3! IBM PC coprocessors for the Atari ST and Apple Macintosh run around \$1,000 each. Who would buy such a card for a CoCo when a separate Tandy 1000 could be purchased for the same price — or less?

For a quicker response, your questions may also be submitted through RAINBOW's CoCo SIG on Delphi. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type ASK for "Ask the Experts" to arrive at the EXPERTS> prompt, where you can select the "Doctor ASCII" online form which has complete instructions.



Replace CoCo 3's built-in HPRINT font

The Font Master

By Eric Wolf

Stored in the new CoCo 3 is a high resolution font, a specially designed HPRINT character set. The area of memory in which the font is stored is called upon whenever the command HPRINT is performed. Each letter of the message is referenced in the font table of the high resolution graphics screen.

The font table is stored in RAM, which means you can read and write to it. (Its memory location is \$F09D through \$F49C, for characters 32-127.) *Font Master* allows you to easily change these characters, giving your Hi-Res screens that personal touch.

Font Master uses the 16-color, 320-by-192 graphics screen of the CoCo 3. It offers onscreen menu selection, complete error trapping, choice of tape or disk, editing commands, and easy integration with BASIC and machine language.

Upon saving, loading and running the program, the main screen appears, consisting of a command set (upper-

Eric Wolf is a free-lance programmer and attends LaSalle High School. He is currently writing a line of computer software that deals with games and utilities, and ML applications for the CoCo.

right), editing window (upper-left) and the current character set (bottom). Let's look at these one at a time.

The Edit window shows an enlarged version of the character you are working on and how it presently looks. The current character set is what the entire character set in memory looks like. The highlighted letter is the letter you are currently editing. The command set is a brief listing of all the commands recognized by the *Font Master*, and includes the following:

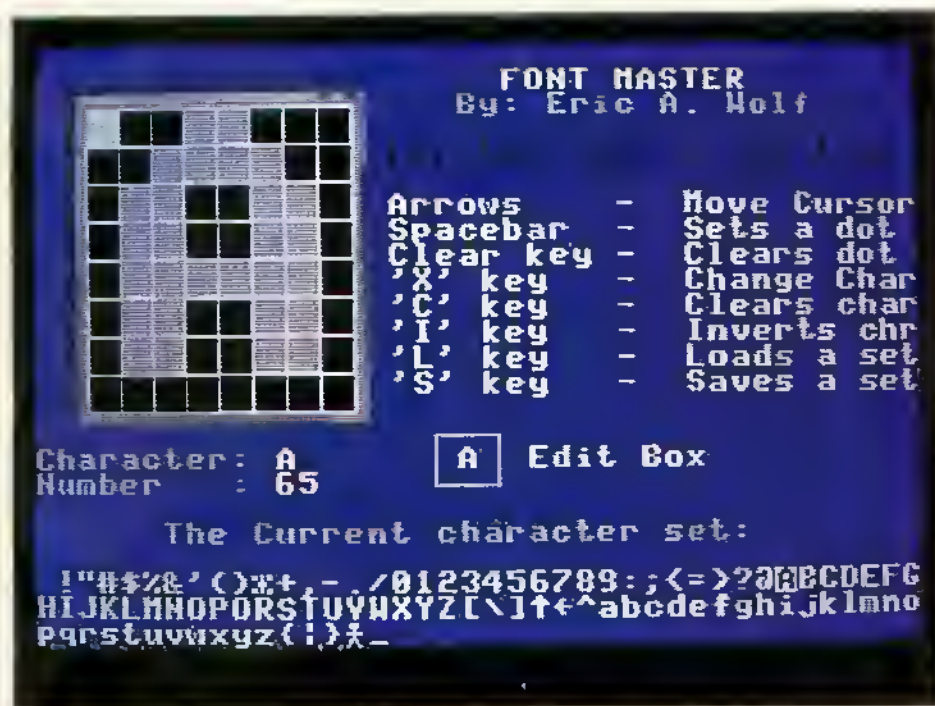
arrows	control the cursor within the editing window
space bar	sets (turns on) a dot in the editing window
CLEAR	resets (turns off) a dot in the editing window
C	clears entire editing window
X	saves current character and allows you to select a new character to edit
L	loads a character set from tape or disk
S	saves a character set to tape or disk
I	inverts the grid (changes white to black and black to white)

I have included two pre-designed font files (cursive and bold) for you to use and modify for your own purposes. They are included on this month's RAINBOW ON TAPE and DTSK.

After you have saved your character set (using *Font Master*), you can integrate it into your own BASIC programs. First, load the program that uses the HPRINT command. Then load your character set — type (C)LOADM and press ENTER. Then, just run your program and the new character set will be in use.

Be careful about pressing the reset button. Doing so restores the original HPRINT font set. After pressing reset, you must reload the character set if you want to use it again.

(Questions or comments about this program may be directed to the author at 1630 N. Johnson St., South Bend, IN 46628. Please enclose an SASE when writing for a reply.) □



✓	130	.....191	425	.....23
	180	.....31	495	.....6
	260	.....243	555	.....200
	305	.....63	640	.....16
	375	.....84	END	.....194

The listing: FONTMSTR

```

15 REM RAINBOW MAGAZINE PRESENTS
20 REM
25 REM *****
30 REM *   The Font Master !!! *
35 REM *   By: Eric A. Wolf   *
40 REM *   Don't Panic Software *
45 REM *   For a CoCo 3 and 128k *
50 REM *****
55 REM
65 ONBRK GOTO 710
70 ONERR GOTO 530
75 PALETTE RGB
80 POKE65497,0
85 RESTORE:FOR Y=0 TO 15:READ A:PALETTE Y,A:NEXT Y
90 DATA 8,56,0,3,3,63,3,0,63,9,0,0,0,0,63
95 ATTR 7,0
100 WIDTH 40
105 HBUFF 1,5000
110 HBUFF 2,128
115 CH=65
120 HSCREEN2:HCLS
125 HCOLOR15:HPRINT(21,1),"FONT MASTER":HCOLOR1:HPRINT(19,2),"By : Eric A. Wolf":HCOLOR6:HPRINT(17,3),"Don't Panic Software":HCOLOR2:HPRINT(16,4),"For the CoCo 3 and 128k"
130 HCOLOR1:HPRINT(6,19),"The Current character set":HPRINT(0,16),"Character":HPRINT(0,17),"Number":HCOLOR15
135 HPRINT(16,6),"Arrows - Move Cursor":HPRINT(16,7),"Space bar - Sets a dot":HPRINT(16,8),"Clear key - Clears dot":HPRINT(16,9),"X' key - Change Character"
140 HPRINT(16,10),"C' key - Clears char":HPRINT(16,11),"I' key - Inverts chr"
145 HPRINT(16,12),"L' key - Loads a set":HPRINT(16,13),"S' key - Saves a set"
150 HPRINT(22,16),"Edit Box"
155 GOSUB250:GOSUB305:GOSUB260:GOSUB280
160 C1=0:C2=0
165 HGET(20+C1*12,20+C2*12)-(20+C1*12+11,20+C2*12+11),1:HCOLOR15

```

```

:HLIN(20+C1*12,20+C2*12)-(20+C1*12+11,20+C2*12+11),PSET,BF
170 A$=INKEY$:IFA$=""THEN170 ELSE HPUT(20+C1*12,20+C2*12)-(20+C1*12+11,20+C2*12+11),1,PSET
175 IF A$=CHR$(8) THEN C1=C1-1:IF C1<0 THEN C1=0:SOUND100,1
180 IF A$=CHR$(9) THEN C1=C1+1:IF C1>7 THEN C1=7:SOUND100,1
185 IFA$=CHR$(10) THEN C2=C2+1:IF C2>7 THEN C2=7:SOUND100,1
190 IFA$=CHR$(94) THEN C2=C2-1:IF C2<0 THEN C2=0:SOUND100,1
195 IFA$=CHR$(32) THEN HCOLOR1:HPAINT(24+C1*12,24+C2*12),1,15:HSET(151+C1,128+C2,15):PLAY"V31T255L255;CC"
200 IFA$=CHR$(12) THEN HCOLOR2:HPAINT(24+C1*12,24+C2*12),2,15:HSET(151+C1,128+C2,0):PLAY"V31T255L255;CC"
205 IFA$=CHR$(67) THEN SOUND100,1:GOSUB265
210 IFA$=CHR$(73) THEN GOSUB320
215 IFA$=CHR$(88) THEN GOSUB385:GOSUB340:GOSUB250:GOSUB305:GOSUB265:GOSUB280
220 IFA$=CHR$(76) THEN GOSUB385:Z$=A$:GOTO405
225 IFA$=CHR$(83) THEN GOSUB385:Z$=A$:GOTO405
230 GOTO 165
235 '
240 ' PROGRAM SUBROUTINES
245 '
250 HCOLOR0:HLIN(0,168)-(319,192),PSET,BF:HCOLOR15:T=21:FOR Y=32 TO 128 STEP 40:A$="":FOR X=Y TO Y+39:A$=A$+CHR$(X):NEXT X:HPRINT(0,T),A$:T=T+1:NEXT Y
255 RETURN
260 HCOLOR3:HLIN(12,12)-(116,116),PSET,BF:HCOLOR1:HLIN(16,16)-(120,120),PSET,BF
265 HCOLOR0:HLIN(144,124)-(166,140),PSET,BF:HCOLOR1:HLIN(144,124)-(166,140),PSET,B:
270 HCOLOR2:HLIN(20,20)-(116,116),PSET,BF:HCOLOR15:FOR X=0 TO 8:HLIN(20+X*12,20)-(20+X*12,20+8*12),PSET:HLIN(20,20+X*12)-(20+8*12,20+X*12),PSET:NEXT X:RETURN
275 GOTO 275
280 T=24:T1=0:A=CH-32:A=A*8:FOR Y=&HF09D+A TO &HF09D+A+7:P=PEEK(Y):FOR X=7 TO 0 STEP-1:IF P>=INT(2^X) THEN P=P-INT(2^X):HPAINT(24+((7-X)*12),T),1,15:HSET(151+(7-X),128+T1,15)
285 NEXT X:T=T+12:T1=T1+1:NEXT Y:H

```

The Professional Color Computer

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For peak performance with any computer, you have to get information into and out of the system as easily as possible.

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The Self-contained ProCase-57 Keyboard • \$79.95

It's the popular HJL keyboard perfectly fitted into its own sleek, low-profile case. Put your CoCo on a shelf or hang it on the side of your desk. ProCase-57 comes with 5-foot cable; installs in just a few minutes with no soldering.

The HJL-57 Keyboard Kit • \$59.95/\$9.95

Overwhelming favorite of serious CoCo users worldwide, the HJL-57 keyboard provides the smooth consistent feel and reliability you need for maximum speed with minimum input errors. Installs in your color computer without soldering. Just \$59.95 for Original or F-version. Kits for CoCo 2 and CoCo 3 are \$69.95.

The NumberJack Keypad • \$59.95

A self-contained numeric keypad for serious number-crunching. Besides the

numbers, it has all the cursors, symbols and math keys, including auto-shifted ADD and MULTIPLY. Includes cable and connectors for solderless installation.

The Monitor Adapter • \$25.95

This universal driver works with all monochrome monitors. Easily installed without clips, jumpers or soldering (except some CoCo 2s with soldered-in video chips). Here's crisp, flicker-free monitor output with all the reliability you've come to expect from HJL Products.

The Monitor • \$99.95

Our high-resolution amber monitor gives you the display preferred by most computer pros. Once you've used it, you'll never go back to the TV set. 12-inch CRT has etched non-glare faceplate. (Requires adapter sold above)

Quick Basic Plus • \$19.95

High-performance programming aid works with any CoCo that has 4 junction keys. 26 one-touch BASIC statements, 10 user-defined macros at a time (save as many sets of macros as you like), auto line-numbering, instant screen dump to printer, and global search, make this software ideal for any BASIC programmer. Specify disk or cassette.

The SoftSwitch • \$89.95

Connect any two parallel printers to one computer; select printers manually or insert a simple printer code in the text to be printed for fully-automatic, all solid-state switching. Complete with three cables and operating instructions.

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```

COLOR0:HLIN(88,16*8)-(112,18*8)
,PSET,BF:HCOLOR15:HPRINT(10,17),
CH:HPRINT(11,16),CHR$(CH)
290 RETURN
295 NEXTX,Y
300 RETURN
305 W2=INT((CH-32)/40):W1=(CH-32)
)-W2*40
310 HGET(W1*8,168+W2*8)-(W1*8+7,
168+W2*8+7),2:HPUT(W1*8,168+W2*8)
)-(W1*8+7,168+W2*8+7),2,NOT:RETU
RN
315 HPUT(W1*8,168+W2*8)-(W1*8+7,
168+W2*8+7),2,PSET:RETURN
320 SOUND200,1:FOR Y=0 TO 7:FOR X=0
TO 7
325 IF HPOINT(24+(X*12),24+(Y*12)
))=1 THEN HPAINT(24+(X*12),24+(Y
*12)),2,15:HSET(151+X,128+Y,0) E
LSE HPAINT(24+(X*12),24+(Y*12)),
1,15:HSET(151+X,128+Y,15)
330 NEXTX,Y:RETURN
335 GOTO 335
340 HCOLOR0:HPRINT(6,19),"The Cu
rrent character set":HCOLOR1:HP
RINT(8,19),"Select new character
":SOUND100,1:GOSUB 315
345 GOSUB 305
350 A$=INKEY$:IFA$="" THEN 350 ELS
E GOSUB 315
355 IF A$=CHR$(94) THEN CH=CH-40
:IF CH<32 THEN CH=CH+40
360 IF A$=CHR$(10) THEN CH=CH+40
:IF CH>127 THEN CH=CH-40
365 IF A$=CHR$(8) THEN CH=CH-1:IF
CH<32 THEN CH=32
370 IF A$=CHR$(9) THEN CH=CH+1:IF
CH>128 THEN CH=127
375 IF A$<>CHR$(13) THEN 345 ELS
E SOUND100,1:HCOLOR0:HPRINT(8,19)
),"Select new character":HCOLOR1
:HPRINT(6,19),"The Current chara
cter set:"
380 RETURN
385 SOUND200,1:A=CH-32:A=A*8:FOR
Y=0 TO 7:P=0:FOR X=0 TO 7
390 IF HPOINT(24+(X*12),24+(Y*12)
))=1 THEN P=P+(2^(7-X))
395 NEXTX:POKE &HF09D+A+Y,P:NEXT
Y
400 RETURN
405 IF Z$="L" THEN 410 ELSE IF Z
$="S" THEN 580 ELSE RUN
410 HSCREEN0:ATTR 7,0:CLS:LOCATE
9,1:ATTR 7,0,U:PRINT"Load a char
acter set:":ATTR 7,0:LOCATE 1,7
:PRINT"Use arrows to select & Pr
ess <ENTER>."
415 CR=1
420 ATTR 7,0:LOCATE 14,3:PRINT"F
rom disk":LOCATE 14,4:PRINT"From

```

```

tape":LOCATE 14,5:PRINT"Exit bac
k"
425 IF CR=1 THEN LOCATE 14,3:ATT
R 1,5:PRINT"From disk"; ELSE IFC
R=2 THEN LOCATE 14,4:ATTR 1,5:PR
INT"From tape"; ELSE LOCATE 14,5
:ATTR 1,5:PRINT"Exit back";
430 A$=INKEY$:IFA$="" THEN 430
435 IFA$=CHR$(13) THEN 450 ELSE
IF A$="^" THEN CR=CR-1:IF CR<1 T
HEN CR=3
440 IF A$=CHR$(10) THEN CR=CR+1:
IF CR>3 THEN CR=1
445 GOTO 420
450 ATTR 7,0:IF CR=3 THEN GOTO 12
0
455 ON CR GOTO 460,475
460 POKE 65496,0:CLS:PRINT"INSERT
"+CHR$(34)+"CHARACTER SET"+CHR$(
34)+" DISK IN DRIVE":PRINT"#0 A
ND PRESS ANY KEY FOR A DIRECTORY
."
465 A$=INKEY$:IFA$="" THEN 465 ELS
E DIR0
470 GOTO 480
475 CLS:POKE 65496,0:PRINT"Prepar
e the cassette recorder":PRINT"f
or loading a character set....."
:PRINT
480 PRINT:LINEINPUT"Enter Filena
me: ";A$
485 IF LEN(A$)=0 THEN 495 ELSE IF
LEN(A$)>8 AND CR=2 THEN 490 EL
SE IF LEN(A$)>14 AND CR=1 THEN 4
90 ELSE IF LEN(A$)>8 AND INSTR(A
$,"/")=0 THEN 490 ELSE 500
490 PRINT"Filename too long !":G
OTO 480
495 PRINT"Please enter a filenam
e !":GOTO 480
500 IF INSTR(A$,"/")=0 AND LEN(A
$)=<8 AND CR=1 THEN A$=A$+"/BIN:
0"
505 ON CR GOTO 510,520
510 LOADM A$
515 GOTO 525
520 CLOADM A$
525 PRINT:PRINT"Loaded ....":FOR
X=1 TO 1000:NEXTX:POKE 65497,0:GOTO
120
530 CLS:B$="Unkwown Error... #" +
STR$(ERNO)+" In "+STR$(ERLIN)
535 IF ERNO=20 THEN B$="I/O ERROR
" ELSEIF ERNO=19 THEN B$="Device
number error" ELSE IF (ERNO=31 O
R ERNO=26) THEN B$="Can't find co
rrect character file" ELSEIF ERN
O=23 THEN B$="Input past end of
file ..."\
540 IF ERNO=1 THEN B$="Syntax Er
ror in line "+STR$(ERLIN)

```

```

545 FORY=1TO2:LOCATE(20-LEN(B$)/
2),6:PRINTB$:NEXTY
550 LOCATE 4,13:PRINT"Do you wis
h to try again (Y/N)"
555 A$=INKEY$:IFA$="Y" THEN GOTO
405 ELSE IFA$="N" THEN 120 ELSE
555
560 IF Z$="L" THEN 455 ELSE 115
565 ATTR7,1:CLS:LOCATE 5,11:PRIN
T"File not on device specified":
GOTO550
570 CLS:LOCATE10,11:PRINT"Input
past end of file":GOTO550
575 CLS:PRINT"ATTENTION USER !!!
":PRINT"ERROR #";ERNO;"IN LINE
";:PRINT ERLIN:PRINT:END
580 HSCREEN0:ATTR 7,0:CLS:LOCATE
9,1:ATTR 7,0,U:PRINT"Save a char
acter set:":ATTR 7,0:LOCATE 1,7
:PRINT"Use arrows to select & Pr
ess <ENTER>."
585 CR=1
590 ATTR 7,0:LOCATE 14,3:PRINT"T
o disk":LOCATE14,4:PRINT"To tape
":LOCATE14,5:PRINT"Exit back"
595 IF CR=1 THEN LOCATE 14,3:ATT
R 1,5:PRINT"To disk"; ELSE IFCR=
2 THEN LOCATE 14,4:ATTR 1,5:PRIN
T"To tape"; ELSE LOCATE 14,5:ATT
R 1,5:PRINT"Exit back";
600 A$=INKEY$:IFA$=""THEN600
605 IFA$=CHR$(13) THEN 620 ELSE
IF A$="^" THEN CR=CR-1:IF CR<1 T
HEN CR=3
610 IF A$=CHR$(10) THEN CR=CR+1:
IF CR>3 THEN CR=1
615 GOTO 590
620 ATTR 7,0:IF CR=3 THEN GOTO12
0
625 ON CR GOTO 630,640
630 POKE65496,0:CLS:PRINT"Insert
disk to save character set upon
into drive #0"
635 GOTO 645
640 POKE65496,0:CLS:PRINT"Prepar
e cassette to save character set
."
645 PRINT:LINEINPUT"Enter Filena

```

```

me: ";A$
650 IF LEN(A$)=0 THEN 660 ELSE I
F LEN(A$)>8 AND CR=2 THEN 655 EL
SE IF LEN(A$)>14 AND CR=1 THEN 6
55 ELSE IF LEN(A$)>8 AND INSTR(A
$,"/")=0 THEN 655 ELSE 665
655 PRINT"Filename too long !":G
OTO645
660 PRINT"Please enter a filenam
e !":GOTO645
665 IF LEN(A$)<=8 AND INSTR(A$,"
/")=0 AND CR=1 THEN A$=A$+"/BIN:
0"
670 PRINT:PRINT"Press any key to
save..."
675 B$=INKEY$:IFB$=""THEN675
680 ON CR GOTO 685,695
685 VERIFYON:SAVEM A$,&HF09D,&HF
49C,&HF09D
690 GOTO 700
695 CSAVEM A$,&HF09D,&HF49C,&HF0
9D
700 PRINT:PRINT"Saved ...":FORX=
1TO1000:NEXTX:POKE65497,0:GOTO12
0
705 REM ** END OF PROGRAM **
710 HSCREEN 0:STOP

```

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The fourth in a series of tutorials for the beginner to intermediate machine language programmer

Machine Language Made BASIC

Part IV: Getting Graphic

By William P. Nee

With this article we start to explore the Color Computer's best capability: the speed and ease with which it can create graphics. The standard way to begin any graphics program is with PMODE, PCLS and SCREEN. These three commands, along with PCLEAR, will set certain locations within the memory. The main locations we will use for graphics and their meanings are shown in Figure 1.

When you first power up, the computer assumes PCLEAR 4, PMODE 0, PAGE 1, and sets the addresses as indicated under START. Since PMODE 0,1 uses only the first graphics page, the computer assumes that you will be using \$600 to \$C00-1 for graphics (\$E00 to \$1400-1 with disk). If not, you must tell the computer something different. The three main graphic commands in machine language are shown in Figure 2.

Nothing is as easy as it looks. If you try these commands, your machine language program will become lost. The problem arises between the PCLS command and where EDTASM+ stores the program. On power-up with EDTASM+, Location \$FF/100 is \$600; this is where the edit buffer (your typed-in program) and the symbol table will begin. Since graphics also begin at \$600, a PCLS will set all graphic bits to 0 and,

Bill Nee bucked the "snowbird" trend by retiring to Wisconsin from a banking career in Florida. He spends the long, cold winters writing programs for his CoCo.

Location	Indicates	Start	W/Disk
\$B6	PMODE (1 - 4)	(0)	(0)
\$B7/B8	end of graphics page +1	(#\$C00)	(#\$1400)
\$B9	bytes per line (\$10 or \$20)	(#\$10)	(#\$10)
\$BA/BB	start of graphics page	(#\$600)	(#\$E00)
\$BC/BD	(#\$600 if not disk, #\$E00 if disk)		

Figure 1

1) PMODE	LDB	\$(0 - 4)	PMODE 0 to PMODE 4
	JSR	\$9628	
	PAGE	LDB	\$(1 - 8)
		JSR	\$9653
2) PCLS	JSR	\$9542	PCLS
3) SCREEN	LDB	\$(0 - 1)	graphics = 1, text = 0
		JSR	\$95AA
	LDB	\$(0 - 1)	color set 0 or color set 1
	JSR	\$9682	

Figure 2

Address	Description	PCLEAR4	W/Disk	PCLEAR8	W/Disk
\$19/1A	basic starts @	#\$1E01	#\$2601	#\$3601	#\$3E01
\$1B/1C	variables start @	#\$1E03	#\$2603	#\$3603	#\$3E03
\$1D/1E	arrays start @	#\$1E03	#\$2603	#\$3603	#\$3E03
\$1F/20	free memory @	#\$1E03	#\$2603	#\$3603	#\$3E03
\$33/34	data statements @	#\$1E00	#\$2600	#\$3600	#\$3E00
\$A6/A7	input buffer @	#\$1E00	#\$2600	#\$3600	#\$3E00

Figure 3

	PCLEAR	1	2	3	4	5	6	7	8
W/Out Disk	0C	12	18	1E	24	2A	30	36	
With Disk	14	1A	20	26	2C	32	38	3E	
LDB	\$(*)	* use number from table above							
STB	\$19								
- OR -									
LDB	\$(1 - 8)	PCLEAR 1 to PCLEAR 8							
LDA	#6								
MUL									
ADDB	\$BC	#\$E00 if disk, else #\$600							
STB	\$19								

Figure 4

in the process, wipe out the buffer. To avoid this problem we must change the contents of \$FF/100.

Graphic pages 1 to 4 are from \$600 to \$1DFF (with disk, from \$E00 to \$25FF), and we must put the edit buffer above graphics. Whatever number we put into Location \$FF/100 must end in 00 and allow enough room for the text program before the ORG address. Let's use \$2800 for the buffer address at \$FF/100. This will allow locations \$2800 to \$3000 for the text and symbols and leave \$3000 and up for the assembled program. This is done in the following manner:

- 1) insert *EDTASM+* cartridge and power up
- 2) press Z and ENTER to get into *ZBUG*
- 3) press W and ENTER to read two bytes at a time
- 4) type FF/ to look at \$FF/100
- 5) type 2800 and press ENTER to change to #2800
- 6) type GC006 and press ENTER to execute SC006 (keeps \$FF/100 the same)

The assembler will now store the written program and symbols in a buffer starting at \$2800. You can actually read the program in the "A" mode starting at \$2A00. The "S" stack starts at the buffer location plus #177, decreasing from there.

The next problem arises if you try to use '5' to '8' in the PAGE command at \$9653. Since the computer is set only for PCLEAR 4, any higher number will give you a Function Call error message. To avoid this, we must PCLEAR some more pages. The BASIC PCLEAR command affects the addresses shown in Figure 3.

These numbers change as your BASIC program increases and becomes more complicated, but their initial value is assigned by the PCLEAR you select. So, in machine language, any PCLEAR must be put at least into Location \$19. Either the program or table shown in Figure 4 can be used to get the PCLEAR HEX value you desire.

The second method, while a few bytes longer, is preferable because it will recognize whether or not disk is being used.

If you want to use PCLEAR B, the

EDTASM+ buffer must begin at \$3600 (\$3E00 with disk) or higher. The program must execute at an address even higher — generally the length of your text program plus an additional 200 bytes. The *EDTASM+* will give you a Bad Memory error message if you try to write your program over the execution address. If it does, increase the ORG location until it is above the text portion of your program.

The program for this article is in machine language only. It can be executed entirely from *ZBUG* and will break when you hit any key without losing the program. Initially, Location \$FF/100 is set to #3E00 to get above disk graphics; the program will ORG at \$4382 to leave room for the editor buffer and symbol table. Once you've typed in the program, switch to *ZBUG*. In the "A" mode you can follow the program and symbols from \$4000 to \$4381. That is why the program must ORG at least at \$4382.

Once the program has been checked for errors, you can examine the buffer locations in the "W" mode for the following information.

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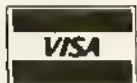
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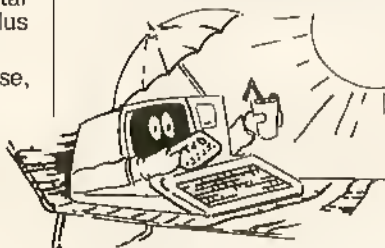
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Location	
buffer start +02	program end +1
+0E	symbols start at
+10	symbols end at
+40	"S" stack location
+9F	text start
+A5	text end
+A9	text start
+AB	text end

PCLEAR	9	10	11	12	13	14	15	16	17	18
W/Out Disk	3C	42	48	4E	54	5A	60	66	6C	72
With Disk	44	4A	50	56	5C	62	68	6E	74	--

Figure 5

The location in Buffer +10 plus 1 will give you the lowest DRG location that will not conflict with the buffer.

Using the EQU command makes typing in routine addresses unnecessary and makes the program easier to follow. Eight pages are cleared; the program is set for PMODE 3,1; PCLS. The screen is filled, then displayed with SCREEN 1,1. The program switches to PMODE 3,5 and then fills and displays the screen. The action keeps alternating until you hit any key — JSR (\$A000). When you do, the computer is reset for text screen and the program ends. In ZBUG, type FINISH = to see that the program ends at \$43DA. Type FINISH - PCLEAR +1 = to get the length of the program, which is \$59 bytes.

A good technique to prevent the slight flicker on the graphics screen when alternating pages is to fill the screen first, then display it with the SCREEN command. This also gives the best animation effect. Since the program starts with PCLEAR, type GPCLEAR or G4382 to execute it. The END must be followed with PCLEAR.

You are not limited, by the way, to eight graphic pages of \$600 bytes each as long as you have enough memory to go higher without running into the edit buffer or the assembled program. The PCLEAR table continues in Figure 5.

Generally, though, PCLEAR 12 is the highest you will use. The buffer must start at least at \$4E00 (\$5600 with disk) and execute even higher (text programs plus symbol length plus \$200).

(Questions or comments concerning this tutorial may be directed to the author at Route 2, Box 216 C, Mason, WI 54846-9302. Please enclose an SASE when requesting a reply.) ☐

The listing: PAGER

EDTASM+/01.00.00 PAGE 1

```

000050 * $FF/100=$3E00
4382      00100 ORG      $4382
          00110 PMODE EQU    $9628
          00120 PAGE  EQU    $9653
          00130 PCLS  EQU    $9542
          00140 SCREEN EQU    $95AA
          00150 CSET  EQU    $9682
4382 G6   08      00160 PGLEAR LDB  #8      FOR 8 PAGES
4384 86   06      00170 LDA    #6      $600 BYTES PER PAGE
4386 3D   BC      00180 MUL
4387 DB   19      00190 ADDB  $B6      WITH OR WITHOUT DISK?
4389 D7   03      00200 STB   $19      WHERE BASIC WOULD START
4383 C6   03      00210 LDB   #3      PMODE 3
438D BD   0628    00220 JSR   PMODE
4390 C6   01      00230 PAGE1 LDB  #1      PAGE 1
4392 BD   0653    00240 JSR   PAGE
4395 BD   0542    00250 JSR   PCLS
4398 9E   BA      00260 LDX   $BA      START OF GRAPHICS ON PAGE 1
439A CC   0000    00270 LDD   #0
439D ED   81      00280 LOOP1 STD  ,X++
439F G3   0003    00290 ADDD  #3
43A2 9C   B7      00300 CMPX  $B7      END OF GRAPHICS ON PAGE 1
43A4 25   F7      00310 BLO  LOOP1
43A6 C6   01      00320 LDB   #1
43A8 BD   05AA    00330 JSR   SCREEN DISPLAY THE SCREEN
43AB C6   01      00340 LDB   #1
43AD BD   0682    00350 JSR   CSET  COLOR SET 1
43B0 C6   05      00360 LDB   #5      PAGE 5
43B2 BD   0653    00370 JSR   PAGE
43B5 BD   0542    00380 JSR   PCLS
43B8 9E   BA      00390 LDX   $BA      START OF GRAPHICS ON PAGE 5
43BA CC   0000    00400 LDD   #0
43BD ED   81      00410 LOOP5 STD  ,X++
43BF 83   0003    00420 SUBD  #3
43C2 9C   B7      00430 CMPX  $B7
43C4 25   F7      00440 BLO  LOOP5
43C6 C6   01      00450 LDB   #1
43C8 BD   05AA    00460 JSR   SCREEN
43CB C6   01      00470 LDB   #1
43CD BD   0682    00480 JSR   CSET
43D0 AD   0F A000  00490 DONE JSR   [$A000]
43D4 27   BA      00500 BEQ   PAGE1
43D6 5F      00510 CLRB
43D7 BD   05AA    00520 JSR   SCREEN
43DA 3F      00530 FINISH SWI
          4382      00540 END    PCLEAR
          RTS IF IN BASIC

```

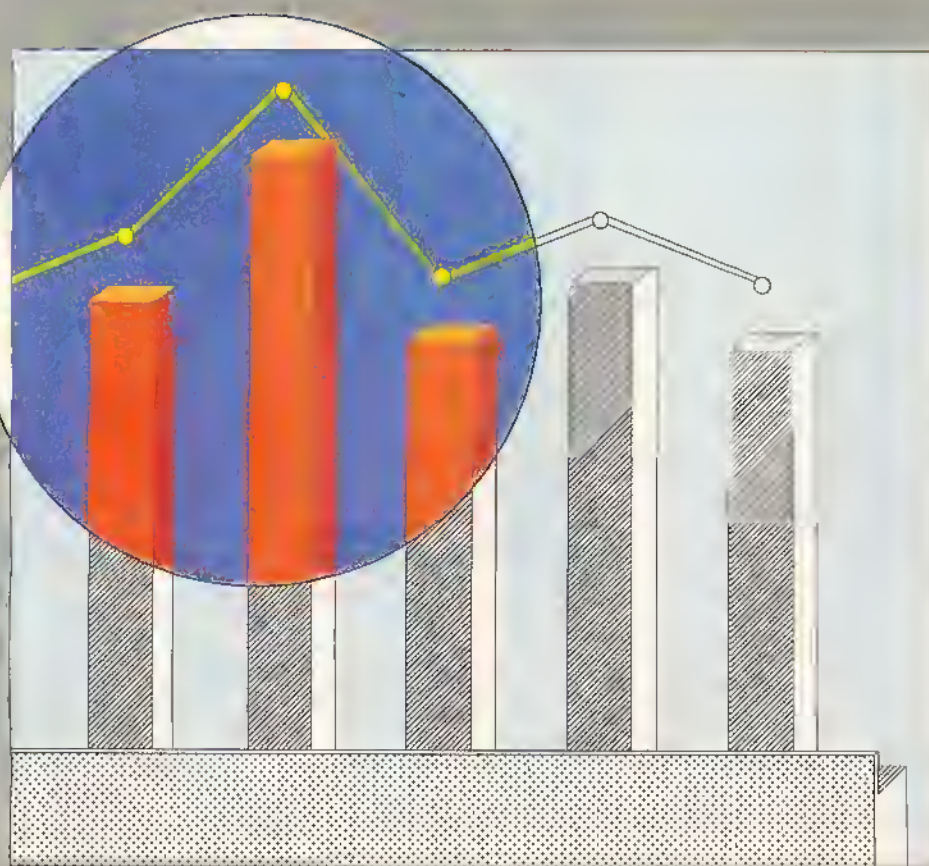
000000 TOTAL ERRORS



Add many more than four colors in HSCREEN 4, plus some techniques to put more style and depth into your graphics

Breaking the Four-Color Barrier

By Rusty Cutchin



Several years ago, as a yearbook editor for two trade associations of electronic technicians, I had the idea of putting the two groups' logos on the cover of the yearbook via the hot new medium of computer graphics. I programmed the designs at home on my CoCo 1 with good old PMODE 4 commands (and lots of artifact colors). But what I remember most about the project was transferring the program's variables to the Zenith Z-100 computer at the office and watching the designs come up in glorious 640-dot-wide resolution and 16 colors. Imagine — diagonal lines became lines instead of staircases, and circles became circles instead of Ferris wheels!

As a part-time layout artist I came to appreciate detail and resolution as much as — perhaps more than — color. Now that the CoCo 3 supports 640-by-192 graphics, I've been surprised to see that the excellent programmers writing graphics editors for the CoCo 3 are sticking with what is essentially a wide PMODE 4 screen (HSCREEN 2) in order to conveniently access 16 colors. This probably has something to do with the number of CoCo users not yet using RGB monitors, without which mixed

Rusty Cutchin is a former editor of Cashbox, the record-industry newspaper. He owns Bass Hit Productions, which produces records and markets music software for the CoCo.

text and graphics in the highest resolution leaves a lot to be desired.

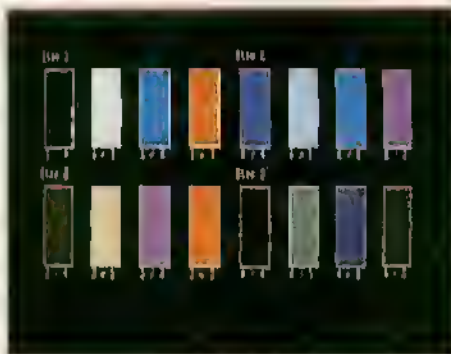
For those of you who *do* have an RGB monitor and don't mind spending a little extra time for more professional-looking results, particularly in business-oriented graphics, I have a couple of programs to easily get many more than four colors in HSCREEN 4, plus some techniques to put more style and depth into your graphics.

These techniques are not sophisticated, and anyone with a rudimentary knowledge of Enhanced BASIC can duplicate and expand on them. Creating new colors is simply a matter of using alternating vertical lines of different colors to create a new color. In HSCREEN 4, the distance between lines is so narrow that a new color or shade is created by the two adjacent lines.

Listing 1, NUCOLORS, illustrates this. After setting up the screen and variables, the program uses the HLINE command to draw 16 boxes on the screen and fill these boxes with lines of different colors to create new colors and shades. The program tells you the step rate of the line loops used, as well as the two color codes that make up the new color in each box. I chose black, white, blue and red as the four default colors in Line 10. As neutral and primary colors, they create the secondary colors purple and gray and pleasing lighter or darker shades of themselves. You can substitute yellow for white and create different shades of green and orange, as well as browns or any other shade that can be created out of four colors.

How you control the actual color depends on the palette colors you use and the step rate of the line loops in lines 45 and 50, where the vertical lines are actually drawn. The step rate 'S' (distance between vertical lines of one color) is initially set to 1 in Line 20, so that the first four boxes will contain the default colors just as if you had set them

with HPAINT. If you set 'S' to '2' in Line 20, the first four boxes will have new colors in them. 'S' will increase by 1 in Line 65 for the next four boxes, returning to a value of 2 in Line 70 for boxes 9 through 12 unless you change these lines. When you leave more than two lines of space between lines being drawn (Step 3 or higher), the area begins to look more like vertical lines than solid colors. If you modify the program by adding another line loop before Line 45 or 50 to use three colors instead of two to make up your new color, however, you'll need Step 3 or higher. NUCOLORS tells you the step rate you're using (above the box), as well as the color codes (below the box).



But how to use these new colors practically, and how to fill areas other than boxes? Listing 2, DEMO, draws a dual business graph, creates a pie chart and bar graph using these new colors, adds colored text to the screen, and illustrates a few simple techniques to make your Hi-Res pictures more appealing. Many business users and hobbyists alike have bought expensive graphics packages, only to find that software doesn't turn you into an artist. A knowledge of basic design and layout principles is just as important when you're creating an advertisement or business graph.

DEMO first draws a background grid in lines 30 through 50. This gives a high-

tech look to your design from the outset, and though a little overused in broadcast graphics, is still effective. It's kept in a darker color so it will stay a *background* design. Then in lines 60 through 130, the program creates two gray background boxes containing shadowed white boxes in which are printed the questions our graphs will answer. The outer box, the inner box and its shadow have given the graphics some 3-D depth with just a few commands. In lines 140 through 190 we use another default color to print the background data for our bar graphs. Notice that we always erase just enough of the blue grid before drawing something new in its place. This keeps images from interfering with each other and also highlights foreground designs.

In Line 200 the real fun begins. We create a blank box in Line 210 that we fill with new colors by going to the subroutine at Line 500 to draw our alternating colored lines. The subroutine at Line 600 draws the circle for our pie chart (Line 225). Then at lines 230 and 240 we call a subroutine to clean up the area outside our circle and presto — a new shape with two colors not in our default HSCREEN 4 palette! The rest of the program uses the lines subroutine (Line 500) to give us new colors for our bars, a new section for our pie chart and text to finish things up.

As you can see, a professional-looking graph or picture with full resolution and more than four colors is easily available, thanks to the great features of the CoCo 3. Here's hoping those talented 6809 programmers out there will enhance their fine products with a professional graphics editor that fully utilizes the CoCo 3's capabilities!

(Questions or comments concerning these programs may be addressed to the author at 1313 Cricket Lane, Woodbridge, NJ 07095. Please enclose an SASE when requesting a reply.) □

Listing 1: NUCOLORS

```
1 'NUCOLORS
2 'BY RUSTY CUTCHIN
3 '
4
5
10 PALETTE1,63:PALETTE2,15:PALETTE3,38:PALETTE4,0
15 HSCREEN4:HCLS4:HCOLOR1
20 C1=1:C2=4:S=1:A=15:B=15:P1=1:P2=10
25 FOR Y=15 TO 110 STEP 95
30 FOR T=1 TO 2
31 S$=STR$(S)
```

```
32 HPRINT(P1,P2-10),"Step"+S$
35 FOR X=A TO (A+240) STEP 80
40 HLINE(X,Y)-(X+48,Y+64),PSET,B
45 HCOLOR C1:FOR V1=X TO (X+45) S
TEP S:HLINE(V1+2,Y+1)-(V1+2,Y+63),PSET:NEXT V1
50 HCOLOR C2:FOR V2=X TO (X+45) S
TEP S:HLINE(V2+1,Y+1)-(V2+1,Y+63),PSET:NEXT V2
51 C1$=STR$(C1):C2$=STR$(C2)
52 HCOLOR1:HPRINT(P1,P2),C1$+" / "+C2$
54 P1=P1+10
```


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Requirements: a CoCo I, II or III with at least 32K, one disk drive, BASIC 1.0/1.1, ADOS 1.0/1.1 or JDOS. Printers supported include: Epson RX/FX, Gemini 10X, SG10, NX10, DMP 100/105/110/130/430 CGP220, many Okidata (check with Zebra), Seikosha GP100/250, Gorilla Banana, Legend 808. Order #C323 CoCo Graphics Designer \$29.95. Ordering Instructions: All orders add \$3.00 Shipping & Handling. UPS COD add \$3.00. VISA/MC Accepted. NY residents add sales tax.

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Animals



Religion



Nature



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Samples From Picture Disk #4



Christmas



Easter & Thanksgiving



Jewish Holidays



New Years, July 4th, Halloween,
Parades, St. Paly's & Valentine's


```

55 C2=C2+1:IFC2=5THENC2=1
60 NEXTX
65 S=S+1

```

```

66 A=A+320:C1=C1+1:NEXT T
70 S=2:A=15:P1=1:P2=22:NEXTY
75 GOTO 75

```

✓	110	.....206	410	.....174
	180	.....23	END	.....73
	285	.....77		

Listing 2: DEMO

```

10 PALETTE0,0:PALETTE1,63:PALETTE2,38:PALETTE3,15
20 HSCREEN4:HCOLOR3
21 '
30 'Draw Grid
35 '
40 HLINE(0,0)-(639,191),PSET,B
45 FORG1=41TO639 STEP40:HLINE(G1,0)-(G1,191),PSET:NEXTG1
50 FORG2=0TO191 STEP 16:HLINE(0,G2)-(639,G2),PSET:NEXTG2
55 '
60 'Draw Question Boxes
61 '
65 HCOLOR4:HLINE(0,0)-(280,10),PSET,BF
70 HCOLOR1:HPRINT(0,0),"WHAT AMERICANS THINK OF THE ECONOMY
75 HCOLOR1:FORX=5TO260STEP2:HLINE(X,19)-(X,52),PSET:NEXTX
80 HCOLOR4:HLINE(12,24)-(255,50),PSET,BF:HCOLOR1
85 HLINE(7,22)-(250,48),PSET,BF
90 HCOLOR4:HPRINT(1,3),"Do you think what has happened
95 HPRINT(1,4),"to the stock market recently

```

```

100 HPRINT(1,5),"will lead to a recession?
105 HCOLOR1:FORX=285TO560STEP2:HLINE(X,19)-(X,52),PSET:NEXTX
110 HCOLOR4:HLINE(292,24)-(558,50),PSET,BF
115 HCOLOR1:HLINE(287,22)-(553,48),PSET,BF
120 HCOLOR4:HPRINT(36,3),"Do you think the national economy
125 HPRINT(36,4),"is getting better, getting worse,
130 HPRINT(36,5),"or staying about the same?
135 '
140 'Print Bar Graph Data
145 '
150 HCOLOR4:FORX=281TO639STEP40:HLINE(X,64)-(X,190),PSET:NEXTX
155 FORY=64TO191STEP16:HLINE(281,Y)-(638,Y),PSET:NEXTY
160 HCOLOR2:HPRINT(35,7),"50 - - - - -
- - - - -
165 HPRINT(35,10),"40 - - - - -
- - - - -
170 HPRINT(35,13),"30 - - - - -
- - - - -
175 HPRINT(35,16),"20 - - - - -
- - - - -
180 HPRINT(35,19),"10 - - - - -
- - - - -
185 HPRINT(35,22)," 0 - - - - -
- - - - -
190 HCOLOR1:HPRINT(38,23),"Better Worse Same
195 '
200 'Draw Pie Chart
205 '
210 HCOLOR1:HLINE(25,70)-(255,190),PSET,B
215 X=25:Y=70:A=140:B=190:C1=3:C2=2:S1=2:S2=2:GOSUB500
220 X=140:A=255:C1=2:C2=1:GOSUB500
225 X=25:A=255:HCOLOR1:GOSUB 600
230 H=4:P=1:E=X+2:F=Y+2:GOSUB700
235 HCOLOR4:HLINE(25,70)-(255,190),PSET,B:GOSUB 600
240 H=4:P=4:E=A-2:F=B-2:GOSUB700
245 '
250 ' Draw Bars
255 '
260 X=325:Y=142:A=365:B=180:C1=4:C2=1:S1=1:S2=2:GOSUB500

```

One-Liner Contest Winner...

This one-liner displays the poke and peek values for the CoCo 3 keyboard. Just press a key. It comes in handy when you're working on key-repeating routines.

The listing:

```

0 CLS
1 W=337:PRINT0,"POKE LOCATIONS AND VALUES FOR THE KEYBOARD";:FOR T=1TO8:PRINT0(W-336)+(T*32)+64,W+T=" ",PEEK(W+T):IF PEEK(W+T)<>255THENSOUNDPEEK(W+T),1:NEXT:GOTO1ELSENEXT:GOTO1

```

???

Larry Lim
Cincinnati, OH

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape*.)

```

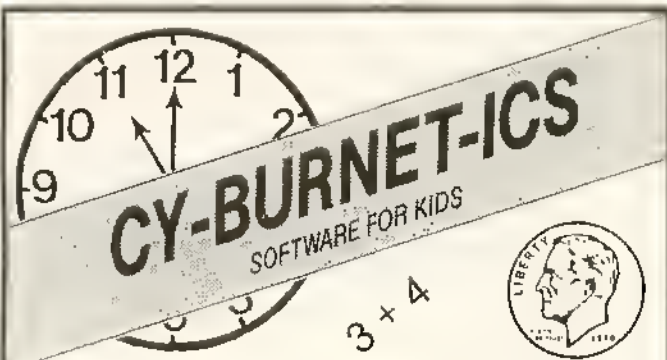
265 X=366:Y=151:A=406:C2=3:S2=3:
GOSUB 500
270 X=430:Y=97:A=470:C1=4:C2=1:S
2=2:GOSUB500
275 X=471:Y=87:A=511:C2=3:S2=3:G
OSUB 500
280 X=535:Y=62:A=575:C2=1:S2=2:G
OSUB500
285 X=576:Y=67:A=616:C2=3:S2=3:G
OSUB500
290 '
300 'Draw Graph Key
305 '
310 X=315:Y=62:A=335:B=70:C2=1:S
2=2:GOSUB500
315 Y=72:B=80:C2=3:S2=3:GOSUB500
320 HCOLOR1:HPRINT(43,8),"Before
the plunge
325 HPRINT(43,9),"After the plun
ge
330 '
350 'Finish circle
355 '
360 HCOLOR4:HLINE(M1,M2)-(M1-R,M
2+10),PSET
365 HLINE(M1,M2)-(M1,M2+R),PSET
370 PT=3:HPAINT(M1-2,M2+4),PT,4
375 HCOLOR1
380 HPRINT(10,13),"Yes

```

```

385 HPRINT(10,14),"31%
390 HPRINT(6,18),"Don't Know/
395 HPRINT(7,19),"No Answer
400 HPRINT(10,20),"19%
405 HCOLOR4:HPRINT(23,15),"No
410 HPRINT(23,16),"50%
415 GOTO 415
420 '
500 'Fill boxes to make new colo
rs (SR)
505 '
510 FORV1=X+1TOA-1 STEP S1:HCOLO
RC1:HLINE(V1,Y+1)-(V1,B-1),PSET:
NEXTV1
515 FORV2=X+2TOA-1 STEP S2:HCOLO
RC2:HLINE(V2,Y+1)-(V2,B-1),PSET:
NEXTV2
520 RETURN
525 '
600 'Draw circle (SR)
605 '
610 M1=X+((A-X)/2):M2=Y+((B-Y)/2
):R=(A-X)/2
615 HCIRCLE(M1,M2),R-2:RETURN
620 '
700 'Clean circle border (SR)
705 '
710 HPAINT(E,F),H,P
715 RETURN

```



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In *this and in future "CoCo Consultations," I will be trying something new. In addition to the familiar Q & A column, I will also include tidbits of information contributed by various folks and, in some cases, comment on the information. Thus, even if you don't have a question, I invite you to send in any little hints or descriptions of experiences you have had with the CoCo that you think might be of interest to the CoCo-owning public in general.*

Using the CoCo 3's MMU

Where would I get the information needed to properly use the MMU of the CoCo 3 to access all 512K of memory via assembly language?

Brian O'Neill
Kirkland, WA

The best reference for that is the service manual for the CoCo 3. This book, which costs about \$14 and can be ordered from the people at your local Radio Shack store (they will have to call Tandy National Parts to order it for you), is the reference that all commercial CoCo 3 software developers use. After a bit of time spent experimenting to clear up a few minor ambiguities in the information there, any assembly language programmer should be fully able to use the MMU of the CoCo 3. If you need to see some examples of its use, however, you might want to order a copy of Spectral's *Super Extended BASIC Unravelled* from Microcom. This is a complete, commented disassembly of the ROM in the CoCo 3 that

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

C O C O



CONSULTATIONS

By Marty Goodman
Rainbow Contributing Editor

includes a guide to the GIME chip similar to that found in the CoCo 3 service manual. By paying careful attention to the start-up code and Hi-Res screen handling code found there, you will see examples of the use of the MMU by Microware's programmers.

CoCo 3 Cold Start

How do I do a cold start on the CoCo 3?

Randall Reid
(RANDOMR)
Warton, Ont.

From BASIC you can type `POKE &H71,0:EXEC&HBC1B` and press ENTER. This resets the cold start flag at \$71 (the same flag used by the CoCo 1 and 2) and then jumps to the special CoCo 3 cold start sequence. That special CoCo 3 cold start routine was "snuck in" on top of what used to be the (unusable) `DLOAD` command. In fact, you can accomplish the same thing by typing `POKE &H71,0:DLOAD` and pressing ENTER! Of course, you can also just hold down the CTRL and ALT keys, press the reset button, then release those keys and press the reset button again. But then you have to gaze briefly at the ugly faces of the "three mugateers."

A Sound Deal

I'm using a NEC Multisync monitor with my CoCo 3 and get an exceptionally crisp, sharp image. But the NEC Multisync doesn't have an audio input. Can you recommend a means of getting sound out of the CoCo 3?

Lewis Kurfist
(LEWKAY)
Parkridge, NJ

The back of the CoCo 3 has an RCA phono-type audio output jack. You can connect that to the Aux or Line Input of any nearby hi-fi system and get sound that way. Or, you can buy a \$12 Radio Shack "speaker amplifier" (Cat. No. 277-1008) and hook that to the CoCo 3 via a cable that has an RCA phono plug at one end and a 1/8-inch mini phono plug at the other. This "speaker amplifier" requires a 9-volt battery, but you may be able to run it off a battery eliminator if the eliminator in question has sufficiently cleanly-filtered DC power so as to prevent a nasty hum in the amplifier.

If you're a hacker, you may want to mount that unit inside the CoCo 3 under the keyboard and "steal" 10 volts to run it from the CoCo's main power supply at the junction of D1 and D2. If you get a hum, you can smooth it out by regulating that power down to about seven volts by using a 7805 regulator whose ground is floated with a small-value (100 ohm or so) resistor.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form which has complete instructions.



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Three do-it-yourself fixes for the hardware hacker

Quick Fixes

By Marty Goodman

Each of the following three discussions present information to enable hardware tinkerers to make inexpensive repairs and upgrades to their CoCo equipment. These three projects have the following in common: They address widespread problems with CoCo systems; they take no more than an hour or two to complete; they require little hardware construction expertise; and the total cost of parts for any of the projects is under \$5.

Although the information will not be presented in a strictly *for-the-beginner* fashion, anyone with modest experience building electronic projects should be able to follow these instructions. Indeed, only one of the three projects

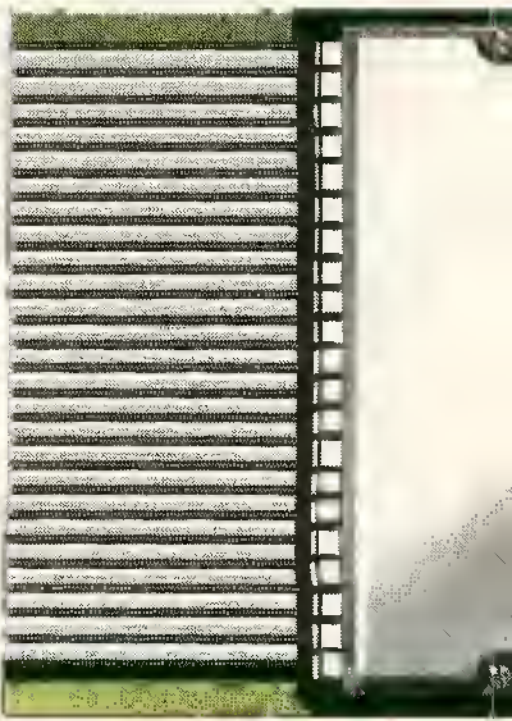
requires that you even read a schematic diagram.

Project One: Sparklies

Many CoCo 3 users have complained of "sparklies." These are little linear flashes of light that appear on a monitor screen some — or all — of the time. Generally, OS-9 Level II users with RGB monitors and 512K of memory report seeing them during disk I/O, but they have been reported by Disk Extended BASIC users on monochrome monitors — even appearing when the disk is not in operation. These are caused by subtle timing problems between the GIME chip and the DRAM chips it needs to address.

Until recently the only known ways to cure the problem were complex, tedious, expensive or all three. You could buy a different brand of DRAMs for your upgrade board, replace the old (1986) GIME chip with a newer variant (1987) of that chip. You could also unsolder your 68B09E chip, replace it with a socket, and insert a 6309E (Hitachi-made CMOS version of the 6809E) in that socket. The DRAM chip and GIME chip replacements cost \$180 and \$50, respectively. The 6309E chip costs \$12 to \$25, is difficult to get and, because the replacement process requires the removal of the CoCo motherboard and the unsoldering of a 40-pin chip, is a viable alternative only for the

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.



most experienced and well-equipped hardware tinkerer.

History of the Fix

In March of this year, Roger Krupski of RGB Systems reported some startling news on Delphi: He had found a way to cure the sparklies with a quick, cheap modification. Roger was experimenting with various-length Y cables on his system (something I have repeatedly warned RAINBOW readers *not* to do) and found that when he added a cable to the system, his sparklie problem got worse. He then decided to manipulate the system-timing in a simple, direct way. He hooked an AM radio-type, 10- to 365-pF variable capacitor in parallel with C10, (a timing fudge factor/RFI suppression capacitor present on the E clock). In this manner, he could *tune out* the sparklies. When he had his long Y cable hooked up, it took more capacity to tune out the sparklies than when he was not using the cable. Roger examined the waveform with his 100-MHz oscilloscope and found that his modification removed some of the overshoot in the E clock waveform and smoothed out a *jog* in the middle of it. It also shifted the time constant for that E clock fudge factor circuit that Tandy had provided.

After considerable experimentation, observation and measurement, Roger arrived at the modification that seemed

to work best. A few other tinkerers on Delphi who had sparklie problems tried it and reported considerable success in curing them. Of course, the following suggestion is still *quite* experimental. It is possible that such manipulation of the clock timing could cause problems (including decreased system reliability.) I recommend that *only* those CoCo 3 owners with serious sparklie problem try the following fix, and I urge those who try it to report to me, in care of RAINBOW, what success they have with the fix.

The Fix

The fix that worked best for Roger is as follows:

Remove R9 and R10 from the CoCo 3 motherboard and replace those 47-ohm resistors with 100-ohm resistors. Then remove C10 and C11 from the board and replace those 39-pF capacitors with 100-pF capacitors.

Help with the Details

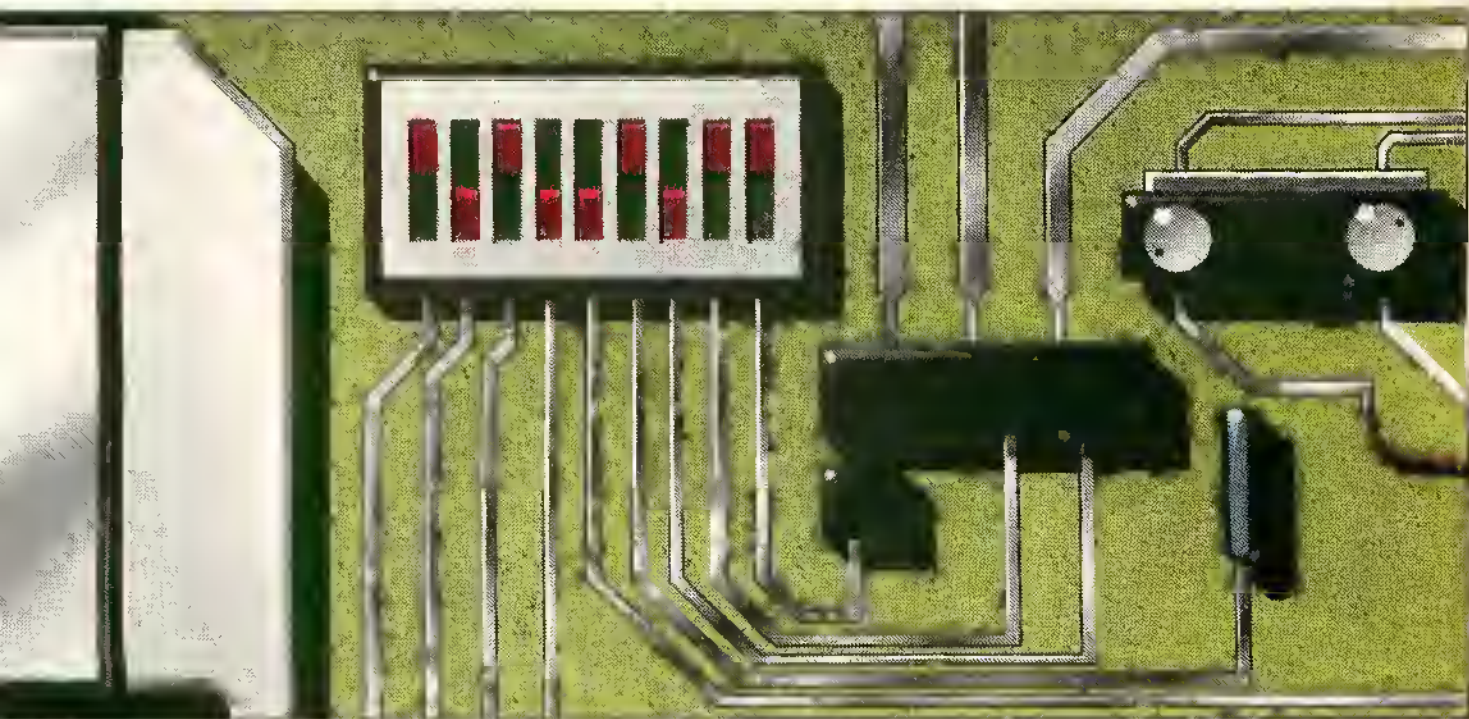
With the computer open in front of you, R9 and R10 are the two small, side by side cylinders just in front (front = toward the keyboard) and near the left-hand corner of the G1ME chip (the 64-pin, square, socketed chip). On the CoCo motherboard, they are clearly marked R9 and R10 in white silk-screened letters. Each has yellow, pur-

ple and black color-bands. Remove and replace these resistors with 100-ohm resistors. The resistors may be purchased at Radio Shack, Cat. No. 271-1311, 271-152 or 271-012. While any one of these three will work, the first (No. 271-1311) will probably fit best physically in the space available.

C10 is a tiny green blob located behind the G1ME chip, to the left of a prominent black cylindrical electrolytic capacitor (C9). C11 is an identical tiny green blob located near the right-hand edge of the board, to the left of the front screw that holds down the 40-pin system bus connector. It, too, is located to the left of a prominent black cylindrical electrolytic capacitor (C27), and immediately to the left of the resistor R11. Both of these capacitors are clearly labeled on the motherboard as C10 and C11 in white silk-screened lettering. Remove both capacitors and replace them with 100-pF capacitors (Radio Shack Cat. No. 272-123).

Your total parts cost for this project should be under \$2.

If the sparklies are not completely cured (or at least considerably lessened), put things back the way they were. Although you will probably destroy the original resistors and capacitors you removed, replacement parts are available at Radio Shack (Cat. No. 271-009 for the 47-ohm resistors; Cat. No. 272-121 47-pF cap will do to replace



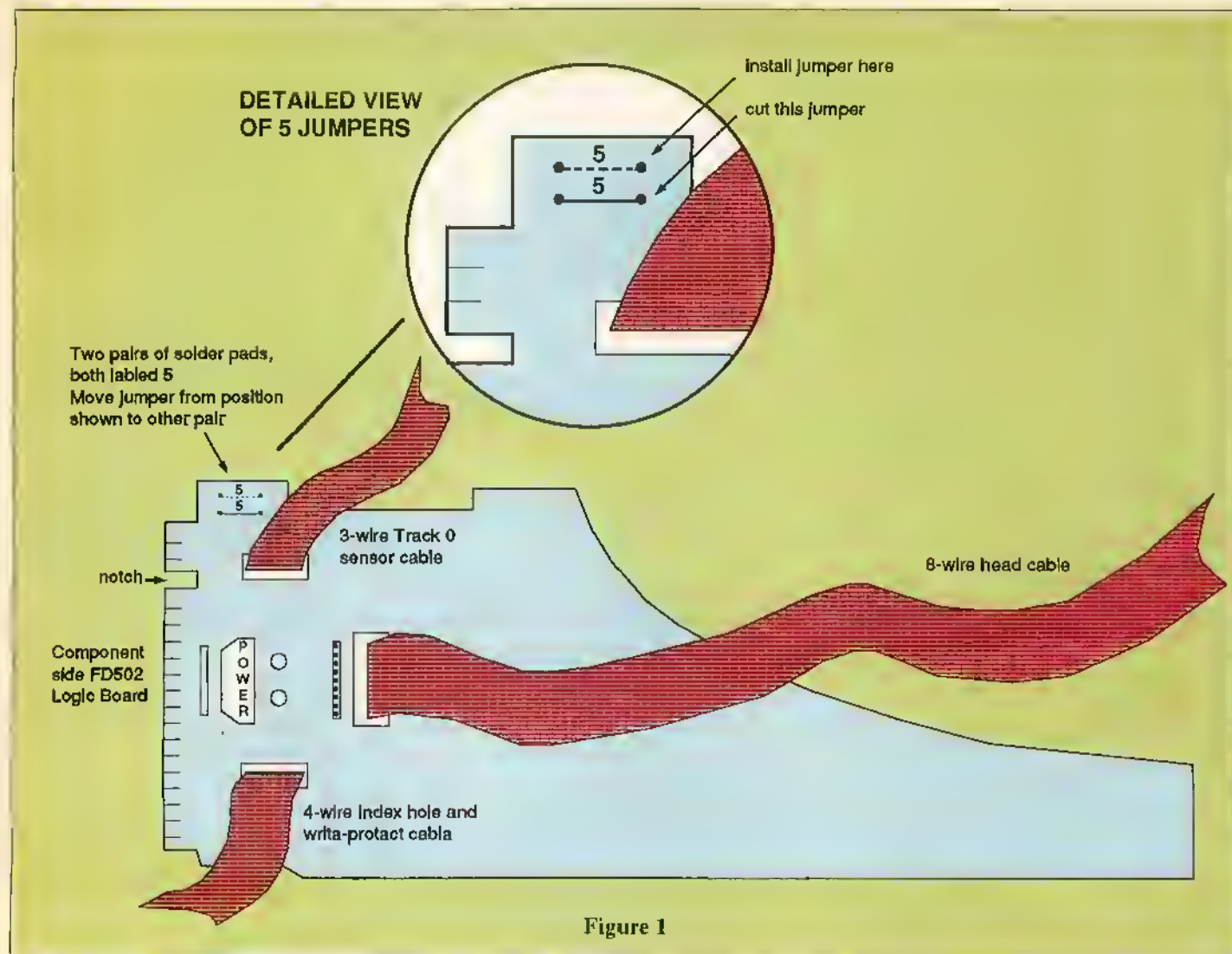


Figure 1

the original 39-pF cap). If the sparklies are not *quite* cured, you might want to experiment with different capacitor values. Try values ranging between 50 and 500 pF.

Remember that opening the case of the computer voids any warranty you might have with Tandy, and that Tandy repair services *does* reserve the right to refuse to repair computers that, in the opinion of the repairperson who sees the machine, are butchered beyond repair by their owners.

Project Two: FD 500/FD 502 Drive Fix

There is a potentially *serious* problem that will plague some owners of the newest disk drive systems sold by Tandy for the CoCo. This problem *only* occurs if you buy *both* your Drive 0 system and your second drive from Radio Shack, and you own a model FD 500 or the latest FD 502 double-sided drive systems. The problem will cause crashed disks when copying from Drive 0 to Drive 1 under both Disk BASIC and OS-9 (although the problem is more serious and frequent under OS-9). However,

there is a simple hardware fix for the problem.

Essential Background

By convention, the disk drive hardware for the CoCo was set up so that when any *one* drive was being accessed, the drive spindle motors on *all* drives in the system are on. All software written for the CoCo, especially the Disk Extended BASIC and the OS-9 Levels I and II operating systems, expect such behavior. This convention differs from the conventions of other PC Compatible, hardware. There, when any one floppy disk is accessed, *only* that disk's spindle motor spins.

Now, because CoCo's disk-access software expects all drive spindle motors in the system to be running when any one drive is accessed, if you tell the computer to read something from one drive and copy it to another drive, the system software will *not* wait for the motor on the other drive to come up to speed. (It knows you have one drive running and assumes that all other drive motors are at speed.)

The Tandon TM65L type drives used in the FD 500 CoCo drive system and the drives used in the FD 502 double-sided CoCo drive system have *jumper*s that determine if the drive motor will start in response to *just* a motor-on signal (as required for proper CoCo operation) or if the motor-on line must be active *and* the drive selected. These jumpers were properly set for CoCo operation on the Drive 0 unit of the FD 500 and FD 502 drives.

However, those buying an addition (Drive 1) to their FD 500 and FD 502 drives are in for a rude surprise. The Tandy stock-added drive for the FD 500 and FD 502 is generally supplied with incorrectly set motor logic jumpers. If you own a two-drive FD 500 or FD 502 system, and *both* drives were purchased from Tandy, check to see if your system has this problem.

Under Disk Extended BASIC, type POKE &HFF40,2 and press ENTER. If the Drive 1 light *and* motor are on, there is a problem that you can correct using the fix described as follows. (If your drives were set up properly, only the Drive 1

light — not the motor — would go on.) You can also check this problem by opening your drive case to see the spindle motors of both drives, typing POKE&HFF40,9 and pressing ENTER. Drive 0's drive light will go on, and its motor should go on, too. If the the spindle motor for Drive 1 does *not* go on as well, you will need to correct this with the fix described below.

The FD 500 Fix:

Open the drive case and expose the bare Drive 1 drive. You may need to completely remove it, disconnecting the 34-pin connector and the four-wire power connector and removing the two screws holding it to the case. Look on the drive's circuit board for three staking pins arranged in a 90-degree angle and labeled JP 7. If pins B and C are jumpered, you have found the problem. Remove the jumper that connects pins B and C, and shift it so that it joins pins A and C. If your drive is a different version, you may have to hunt for the jumper that correctly affects the motor's operation. Look for a jumper with zero resistance to Pin 16 (motor status) of the drive's 34-pin connector.

The FD 502 Drive Fix:

The FD 502 drive is a bit more complicated to fix. The FD 502 drive's motor logic control jumper is *soldered* in, and the jumper is relatively inaccessible, requiring that you not only remove the drive from the case, but that you also partly or completely remove the logic control board from the bare drive to gain access to the right jumper.

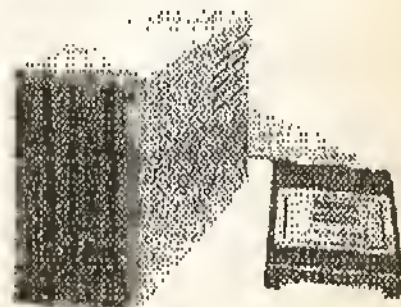
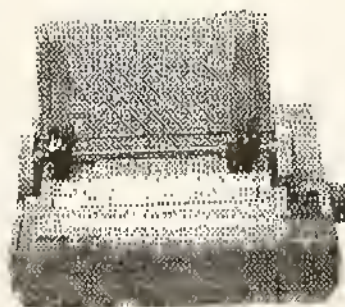
Open up the disk drive case and remove the top (Drive 1) drive (see Figure 1). This will entail removing four screws to open the case, the four-wire power connector and the 34-wire edge card connector from the drive and the two screws that hold the drive in place.

Next, look at the component side of the drive's printed circuit logic board. The component side has prominent cylindrical electrolytic capacitors and a number of connectors attached to it. (The underside of that board has some surface-mount resistors and capacitors soldered to it.) Position the board so that the edge connector is facing you, and the little notch in that connector is to your left. You must now identify three connectors.

To the left of the four-wire power

connector's original position is a connector that hooks to a three-wire mylar cable going to the Track 0 detect sensor. Further back and to the right of the power connector is a four-wire mylar cable that plugs into the circuit board, carrying Index-Hole and Write-Protect detector information. Behind the four wire power connector, some cylindrical capacitors and some bare staking pins, is an eight-wire mylar connector that carries signals from the drive motor's heads to the logic board. You will probably have to remove all three of these cables at their logic board connection.

These three mylar cables are attached to little white connectors that, in turn, plug into mating connectors on the circuit board. Do *not* tear the mylar when removing these connectors. Note, too, that the mylar is *not* plugged directly into the connector, as is the case with the CoCo keyboard connector. It is *bonded* to a connector, which mates to another connector that is soldered to the PC board. Do not try to pull the connector out by the mylar ribbon. Try using a jewelers' screwdriver to carefully remove those connectors.



Hardware

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After you have removed these three connectors, you will find three hold-down screws that attach the printed circuit board to the disk drive. Remove these, and lift out the printed circuit board from the drive.

To the left and behind the notch that marks Pin 2 of the 34-pin connector, you will see two pairs of pads on the circuit board labeled 'S'. While the right pair is jumpered, the left pair is not. Remove the jumper from the right pair of pads, and solder one across the other pair of pads.

Put the drive back together, attach the connectors and reinstall the drive in the cabinet.

Testing Your Work:

From Disk BASIC, type POKE &HFF40,2 and press ENTER. The Drive 1 light should come on, but *none* of the motors should go on. While POKE &HFF40,8 should cause *both* motors to go on, *none* of the drive lights should go on. POKE &HFF40,10 should cause both motors and the Drive 1 light to go on, and POKE &HFF40,0 should turn everything off. If your system behaves in that fashion, you've fixed it properly. If it behaved in that fashion originally, you should *not* attempt to fix it.

Thanks to Kevin Darling (KDARLING) of Raleigh, NC. Kevin was, to my knowledge, the first person to discover the FD 502 drive problem. Kevin was developing driver software for Tony DiStefano's No Halt Controller using a two-drive FD 502 system and kept running into problems. Eventually, he discovered the improperly jumpered FD 502 Drive 1 unit. It was an impressive detective job. Kevin later collected reports that the FD 500 system had a similar problem. Thanks, also, to Glen Hathaway (HATHAWAY) who informed me of the JP 7 on his Tandon TM65L jumper and its effect on the motor logic.

Project Three: Multi-Pak Upgrade

As I wrote over a year ago, Tandy has recommended that owners of all Multi-Pak models who want to use them with a CoCo 3 must upgrade them. At present, I am uncertain whether the upgrade is required for the new Multi-Paks (Cat. No. 26-3124), but still recommend it be done. Some of the Cat. No. 26-3134 Multi-Paks currently sold have an 'A' suffix after the catalog number (26-3124A), and have the upgrade board already installed. Those with older Cat. No. 26-3124 Multi-Paks should read on for instructions on how to make up and add this upgrade board themselves.

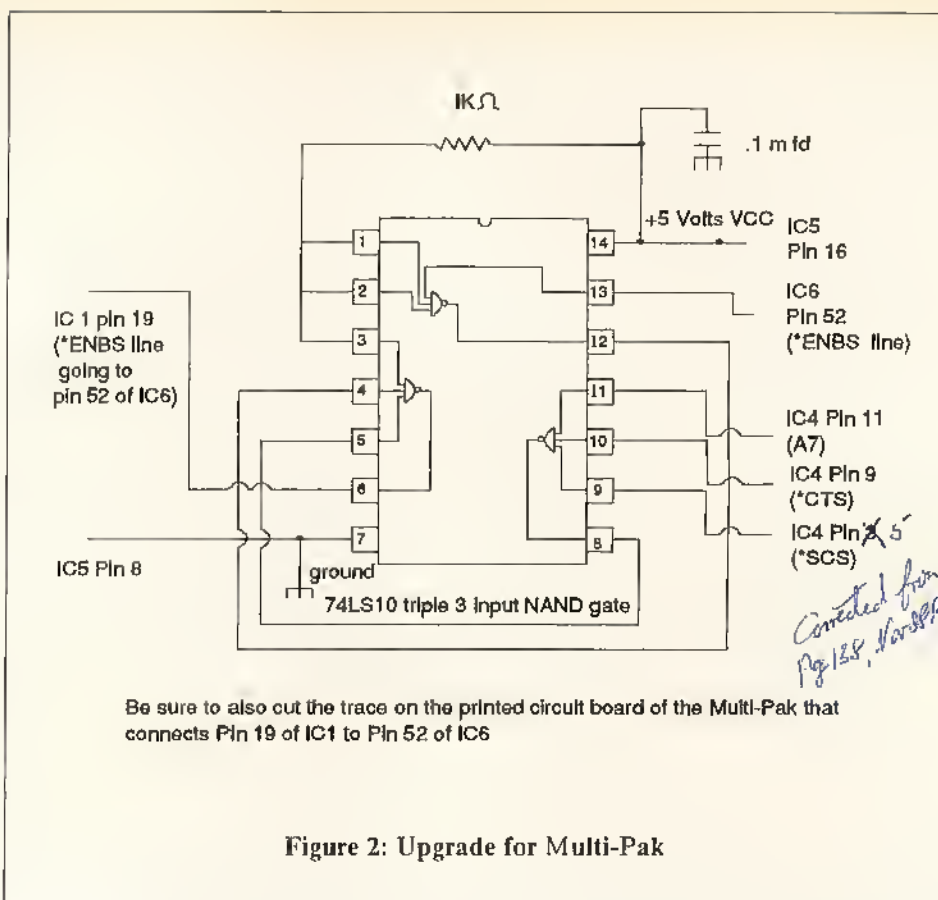


Figure 2: Upgrade for Multi-Pak

The needed upgrade for the older Multi-Pak (Cat. No. 26-3024) was easy. You obtained a new PAL chip for it, and replaced the old, socketed PAL chip in the Multi-Pak with this new one. For a while, that upgrade PAL chip was available through Tandy National Parts. More recently, National Parts has refused to provide that part to end users. However, the part is still available from third-party CoCo retailers, such as Microcom.

Owners of the smaller, newer (Cat. No. 26-3124) Multi-Paks faced a more difficult upgrade. A Satellite Board had to be ordered from National Parts and then properly installed. This board is currently hard to get, and the instructions for its installation that I provided over a year ago are also dated, because those old instructions were keyed to particular wire colors. Tandy has since changed the wire colors of the upgrade board, making my original instructions nearly useless.

One of our members on Delphi took the trouble to "reverse engineer" the Multi-Pak Satellite Board upgrade and post a schematic for it. The upgrade consists of a *single*, 35-cent small scale TTL logic chip, a 10-cent deglitching capacitor and a 5-cent resistor. With the information provided in the schematic diagram (Figure 2) and a small printed

circuit board, hardware tinkerers should be able to do their own upgrade for a fraction of the cost charged by Tandy repair.

Those who would attempt this upgrade must be sure to first *cut* the trace that connects Pin 19 of IC 1 to Pin 52 of IC 6 on the printed circuit board of their Multi-Paks. Note that IC 6 is a monster square integrated circuit. It is a custom chip made *just* for the Multi-Pak. Note, too, that its pins are smaller than those of the other ICs — soldering to Pin 52, as called for in the upgrade, can be a delicate matter. Skill and fine tips on your soldering iron are both essential.

The schematic diagram shows the 74LS10 (triple three input NAND gate) IC with its pins arranged as they actually are on the chip, but it also shows what the pins connect to internally. This upgrade turns off the Multi-Pak's data bus when addresses that have Bit 7 set are presented to it. This protects the GIME chip registers from bus conflicts with any I/O devices plugged into the Multi-Pak that try to use addresses greater than \$FF7F. Addresses accessed via the *CTS line (\$C000 through \$DFFF) and the *SCS line (\$FF40 through \$FF5F) are unaffected.

Thanks to Jim Johnson (REINDEER), who provided this information.

SUNDOG SYSTEMS

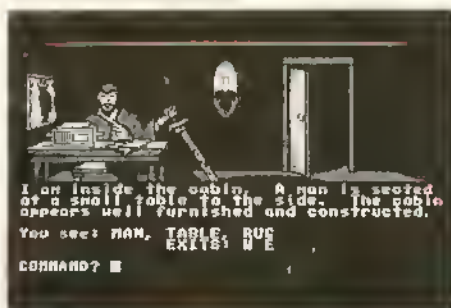
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Those who have been using Delphi for a year or so may be familiar with the Delphi Advantage plan. Essentially, this plan offers reduced rates for members who guarantee to use at least \$24 worth of online time each month. Now Delphi has reduced Advantage Plan usage rates to \$4.80 per online hour. Figure 1 shows a comparison between Delphi Advantage rates and the hourly rates of two other services.

To sign up for the Delphi Advantage, enter USING ADVANTAGE at the Main> prompt on Delphi. There is a one-time entry fee of \$19, and you must commit to using at least \$24 of online time each month (unused portions of the \$24 do not carry forward to the next month.) The \$24 usage commitment is applied at the beginning of each month. Many of you probably use Delphi quite a bit more than this already. A quick review of your account should be all that is necessary to determine if the Delphi Advantage would be beneficial to you.

In addition to the reduced access rates, Delphi Advantage members receive the monthly Delphi newsletter and a monthly summary of usage. The plan is open to all members in good standing (no outstanding accounts). You can cancel online anytime you decide the plan is not helping you.

A New Development

Through an agreement with Dave Thomas (MORTIMER), Falsoft, Inc., publishers of THE RAINBOW and PCM, now manages the Portable Place SIG on Delphi. PCM has covered the Tandy portables for more than five years now. While PCM's magazine coverage of portable computers will still exclude non-Tandy products, the newly acquired SIG welcomes users of all portables. Good luck to the staff as they embark in this new direction.

Oldie, But Goldie

Last month we covered some useful applications of files in the Delphi Workspace. Now, let's focus our discus-

Cray Augsburg is RAINBOW's technical editor and has an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Kentucky. His username on Delphi is CRAY.

Lower rates, expansion and online editing

Time for a Change

By Cray Augsburg
Rainbow Technical Editor

sion on the files themselves or, rather, the text editors used to create them.

In the past, we have used the CREATE command to build text files online. This is OK for simple notes. But what if we want to correct mistakes in longer files?

The CREATE command only lets us write the file. Once a file is saved, the only way to make corrections is to retype the entire file. Here is where Delphi's online text editors really come in handy.

Delphi offers a choice between two different line-oriented editors: *EDT* and *Oldie*. I prefer to use *Oldie* because its command structure is based on slash commands as are other areas of Delphi. In addition, *Oldie* shows you exactly where you are in the file by supplying you with two numbers. The first number indicates your current position in the file. The second number indicates the total number of lines in the file.

We'll save discussion of *EDT* for a future column. Use the Settings section of Workspace to set *Oldie* as your default online text editor. To invoke the editor while in Workspace, enter EDIT *filename*. Listed below are the commands available with *Oldie*. Please note the slashes are used as delimiters in the command lines. They are required.

- /APPEND/*string*/ adds the text *string* to the end of the current line.

Database Report

By Don Hutchison

Rainbow CoCo SIG Database Manager

This month in the CoCo SIG, we've got some great graphics that I'm sure you will enjoy.

OS-9 Online

In the General topic of the database, Keith Alphonso (ALPHASOFT) uploaded a text file describing Alpha Software Technologies' BBS system. Jim Johnson (REINDEER) sent in an article about creating a customized system disk that boots up into an 80-column text window.

The Utilities topic includes Bill Brady (OS9UGED), who posted a file management utility called Runner, and John Beveridge (JOHNTORONTO), who uploaded a program to remove the first block from files sent in CoCoBin format by the *Wiz*.

In the Patches topic, Chris Burke (COCOXT) sent us a patch to correct a bug in the Rename command of *EZGen* Version 1.04. Chris also uploaded an *EZGen* script to fix an error processing bug in Version 2.2b of the Burke & Burke BBFDisk.dr hard disk driver. Kevin Darling (KDARLING) uploaded an 80-column patch for *TS/Editor*, provided by Bob Santy.

In the Telcom topic, Merle Kemmerly (TOOK3) uploaded Version 3.0.0 of *Telstar*, a terminal program for the CoCo 3 under Level II OS-9. Bill Brady uploaded the *WizACIA* device driver and M2w descriptor (the ACIA port driver used by the *Wiz*). Bill also posted the source code for the SuperBoard version. Warren

<u>Time Period</u>	<u>Speed</u>	<u>Delphi Advantage¹</u>	<u>CompuServe²</u>	<u>GEnie³</u>
Evenings/Weekends	2400 bps	\$4.80/hr	\$12.75/hr	\$12.50/hr
Evenings/Weekends	1200 bps	\$4.80/hr	\$12.75/hr	\$5.00/hr
Evenings/Weekends	300 bps	\$4.80/hr	\$6.25/hr	\$5.00/hr
Daytime	2400 bps	\$12.60/hr	\$12.75/hr	\$42.50/hr
Daytime	1200 bps	\$12.60/hr	\$12.75/hr	\$35.00/hr
Daytime	300 bps	\$12.60/hr	\$6.25/hr	\$35.00/hr

1) Delphi Advantage evenings/weekends rate via Tymnet, Telenet or Direct Dial. Daytime Advantage rate via Tymnet. Daytime Direct Dial is \$8.40/hr and for access via Telenet is \$16.20/hr. International pre-paid rate is \$7.20/hr at all times. Higher rates for access from some locations. Go to USING ADVANTAGE online for details.

2) CompuServe access via CompuServe network. Add \$10 to daytime rate and \$2 to evenings/weekend rate for access via Tymnet and Telenet.

3) GEnie access via GEISCO network at half-duplex only.

Figure 1: Service access rates as of August 1, 1988.

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7622



8CM515



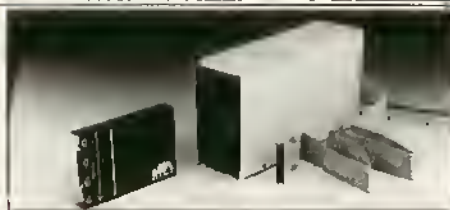
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- **/BOTTOM** moves the edit pointer to the bottom of the file.
- **/CHANGE/string1/string2/** replaces *string1* in the current line with *string2*.
- **/DELETE** removes the current line from the file.
- **/DIRECTORY** shows a directory of Workspace files.
- **/EDT** invokes *EDT*. (You can always move to *EDT* from *Oldie*, but you cannot call *Oldie* from within *EDT*.)
- **/EXIT** leaves the editor and saves the file.
- **/FETCH** merges an existing Workspace file into the file you are now editing.
- **/GLOBAL/string1/string2/** changes all occurrences of *string1* in the file to *string2*.
- **/HELP** shows the HELP command list onscreen.
- **/INVISIBLE** toggles the line number

display on and off.

- **/LOCATE/string/** finds the next occurrence of *string* in the file and moves the edit pointer to that line.
- **/NEXT** moves the edit pointer to the next line in the file. You can also use **/+** to move one line forward and **/-** to move one line backward.
- **/PRINT** prints the current line on the screen.
- **/QUIT** leaves the editor without saving the file.
- **/REPLACE/newline/** replaces the current line of text with *newline*.
- **/SAVE** saves the current file — as it stands — as a Workspace file.
- **/TOP** moves the edit pointer to the top of the file.
- **/UPLOAD** merges a file from your computer into the file you are editing at the current position of the edit pointer. Uses buffer capture (^R/^T

flow control).

- **/VIEW** toggles display of the text on and off. It affects display of text while using **/NEXT**.
- **/WHERE** is used to find the current position of the edit pointer. (Especially useful for those who have used **/INVISIBLE** to turn off the line number display.)

These slash commands can be abbreviated *if* enough characters are supplied for the command to be unique. In fact, you can abbreviate all the commands down to one character except **/DIRECTORY** and **/EDT** (**/D** defaults to delete and **/E** will exit the editor).

Next month we'll learn to use these commands to make online editing of text files a breeze. ☺

Hrach (WAROCK) posted *RiBBS-Trek*, a rework of the public domain *Star Trek* game for use on *RiBBS* systems. Jim Hollier (PGJIM) sent us *JTerm* Version 2.9, an upgraded version of the popular *JimmyTerm* program. Bob Ayella (BOBAYELLA) uploaded *BBTerm*, a freeware terminal program. Finally, Paul Pollock (PAULBELI.) posted a set of accessory programs for use with *XCom9*.

Barry Aaron (BARRYAARON) uploaded a BASIC99 program for the Graphics and Music topic. Barry's program generates complicated and attractive patterns of dots.

The Programmers Den topic gives us Mike Stute (GRIDBUG), who uploaded the *Printf* and *Scanf* functions for the standard C library.

CoCo SIG

Jerry Semones (JERRYS) posted a humorous text file called *And It Was Good*, which describes the corporate decision-making process, in the General Information topic of the database.

In the CoCo 3 Graphics topic, Bruce Nelson (DOCNELSON) uploaded his picture of the galaxy. Mark Garbarini (F19) uploaded four original drawings that he created with *The Rat*, and I (DONHUTCHISON) posted the CoCo Gallery files for three previous months. John

Barrett (JBARRETT) sent us two of his *CoCo Max 3* pictures. Eric Robichaud (EGROBICHAUD) uploaded an updated version of his MGE viewer utility for MS-DOS machines. (The MS-DOS programs, *PKXARC* or *ARC* are required to unARC these files. *TC*, as used on the CoCo, will *not* work.) Bob Wharton (BOB-WHARTON) posted some fantasy drawings, a picture of the Qantas koala, an NFL logo, and the 1988 Baseball All-Stars' logo. David Mills (DAVIDMILLS) uploaded a nude drawn by Brad Bansner. Finally, Zack Sessions (ZACKS) uploaded some PMODE4-to-MGE conversions and a program he wrote to do them.

The Source for 6809 Assemblers topic includes Roger Krupski (HARDWAREHACK), who posted an 80-column screen dump program for the CoCo 3, and Jason Forbes (CO-CO3KID), who posted the source code for his game *Life*.

In the Utilities & Applications topic, Robert Pierce (RPIERCE) sent us a disk editor package, and Eric Tilenius (TILENIUS) uploaded a utility that breaks the long lines in ASCII files (created by many word processors) into files containing lines of a specified length. (This utility inserts carriage returns as needed to ensure that line length.) Malcolm Heath (MACHEATH) uploaded his

no-hassle check register for the CoCo 3. While Ken Halter (KENHALTER) posted a program that prints four disk directories in a row, Craig Moore (CRAIGMOORE) posted *CMAudio*, a freeware sound-sampling program designed for the CoCo 3. Troy House (AMTEX) uploaded his *TV Guide Companion*.

In the Hardware Hacking topic, Marty Goodman (MARTYGOODMAN) uploaded a text file that describes how to modify a standard Hi-Res joystick adapter for use with *CoCo Max 3*.

The Classic Graphics topic included my posting of the CoCo Gallery files for twelve previous months, Jason Forbes' *Life* tutorial graphics and some graphics simulations for the game and some of John Barrett's favorite cute faces.

Dick White (DICKWHITE) posted six archived poll results files in the Archives topic.

Product Reviews & Announcements included Mike Stute's review of *Lyra* Version 2.52, and Spencer Lepley's (SPENCELEPLEY) review of *Max-10*.

In the Data Communications topic, Malcolm Heath posted a version of the *WeFax* program for the DMP-105/106 printer.

That does it for this month. See you online on Delphi! ☺

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Using 512K CoCo 3 you have access to 2 additional disk drives in RAM. All disk commands are supported, and the data are Reset button protected. You can now have up to 5 disk drive capacities on line at once and can assign the ram disks to any drive number. By making the ramdisk Drive 0, all programs which require a lot of drive access will run much faster. You can have the *RAMDISK* in memory at the same time as the *Printer Lightning*!

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This program is the fastest way to make backup copies of your files using a 512K CoCo. You can backup 35, 40, or 80 track disks single or double sided. Both RS and OS-9 disks may be backed up. The original disk is saved to memory and a copy can be made on an *unformatted disk* every 45 seconds! The lightning read, write, format, and verify routines that were developed make this program much quicker than RSDOS or OS-9 for backups. This will become one of your most used programs!

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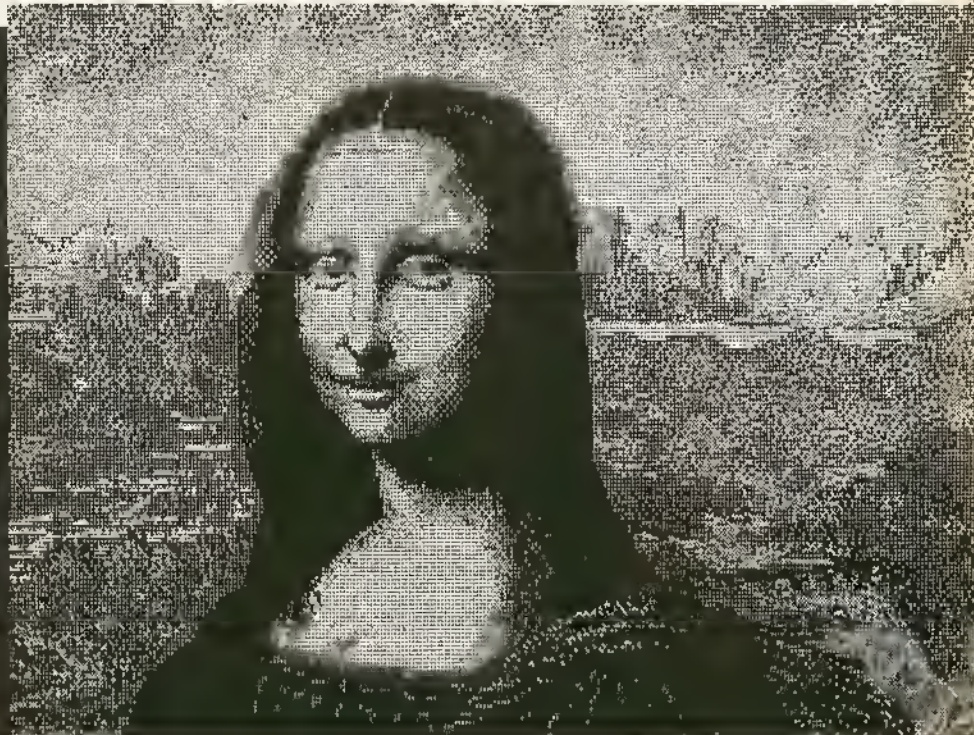
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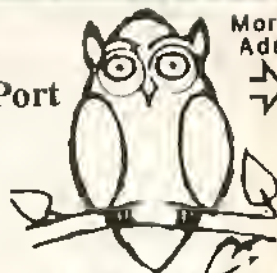
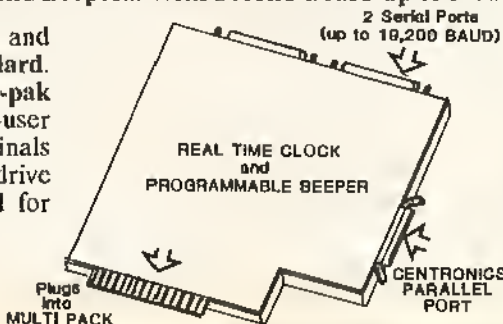
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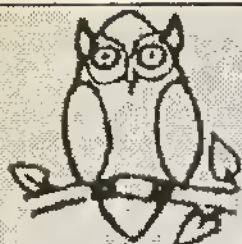


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*All feature details are believed to be true at time of writing and are subject to change. We believe that our BASIC hard drives are the fastest due to our indexing method, but all three systems are fast. On ours all BASIC commands work including DSKINI, DSKIS, and DSKOS.

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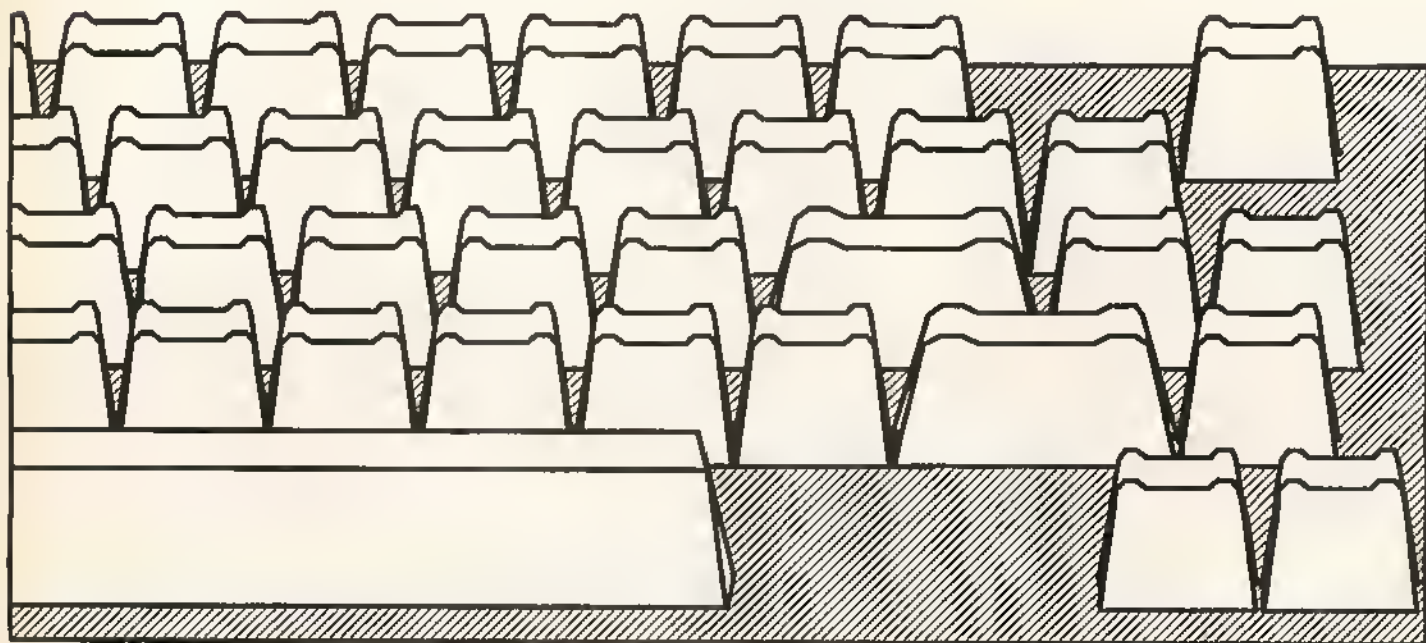
A program to make your keyboard perform like the big boys — and more

Get More Power From Your CoCo Keyboard

By Michael Sweet

Every month more and more hardware and software seems to come out for the CoCo, and the first thing most CoCo owners get is a new keyboard. Most available keyboards contain four extra keys, either four function keys or two function keys and the ALT and CTRL keys. The program presented in this article will patch BASIC so the extra keys will perform functions similar to those of the PC Compatibles. Also added are a print spooler (32K buffer for 64K machines), an added device number for owners of the Radio Shack Sound-Speech Pak, and a screen print (dump to printer) routine for both

Mike Sweet is a student at Cayuga County Community College. He has won awards for programming in the New York state math symposium and hopes to make programming his career.



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Drive 1 Complete	\$119.	\$134.
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the text screen and any graphics screens.

The standard CoCo keyboard contains 54 keys, with the SHIFT keys tied to the same input so that the computer "sees" only 53 keys. Radio Shack did not allow for the four extra keys, so the normal key scan will not return correct codes for these keys. To utilize the extra keys, you will need an assembler (*ED-TASM+* or similar). As listed, the program will work on a 32K CoCo or a CoCo 3. It can be altered to work with 16K and 64K machines as follows:

For 64K systems, make the following changes:

```
100      ORG      $7800
1690     CMPX     #$FF00
2100     CMPX     #$FF00
```

and add the following lines:

```
1660     STA      $FFDF
1680     STA      $FFDE
2070     STA      $FFDF
2090     STA      $FFDE
```

For 16K systems make the following changes:

```
100      ORG      $3000
1690     CMPX     #$4000
2100     CMPX     #$4000
```

Please note that the 64K version will *not* work properly on a CoCo 3.

Once you have assembled the program to tape or disk, go into BASIC, type CLEAR 200, &H6FFF for 64K or CLEAR 200, &H27FF for 16K and load the program. Execute the program, remembering that you must never type EXEC more than once after you have loaded it — doing so will destroy all the old I/O routine pointers. If you have typed the program in correctly, all the keys should function normally. Holding them down should yield auto-repeat. The extra keys should work as shown in Figure 1.

The program initializes itself at START by redirecting BASIC's I/O routines (screen output, keyboard input and printer output). Note that the INKEY\$ function address is changed to point to a new routine (lines 340 through 430) so that it will check the keyboard buffer. The between-statements routine is also redirected for the same reason (lines 440 through 450). BASIC also checks to see if you have specified a legal device number (as in a PRINT#-1 statement) and reports an FC error if you haven't. In order to allow a device number of -3 for the Speech Pak, this also had to be changed

* ALT + letter or number = Command

@	PRINT @	S	SIN(
A	ATN(	T	TAN(
B	BACKUP	U	USING
C	CDS(	V	VERIFY
D	DATA	W	WRITE
E	EDIT	X	PEEK
F	FILES	Y	POKE
G	GOTO	Z	PPDINT(
H	HEX\$(	0	RND(0)
I	INPUT	1	H-1,
J	JOYSTK(	2	H-2,
K	KILL	3	H-3,
L	LINE	4	&H
M	MEM	5	&D
N	NEW	6	CHR\$(
O	OPEN	7	STRING\$(
P	PRINT	8	INSTR(
Q	PSET	9	MID\$(
R	PRESET		

Unshifted

* F1 RUN and ENTER
* F2 LIST and ENTER

Shifted

* F1 SCREEN 0 and ENTER
* F2 POKE 111,254:DIR and ENTER

* CTRL + letter = Command

@	screen print (dump to printer)
A	CHR\$(1)
B	CHR\$(2)
C	CHR\$(3) or BREAK
D	CHR\$(4)
E	CHR\$(5)
F	CHR\$(6)
G	CHR\$(7)
H	CHR\$(8) or left arrow
I	CHR\$(9) or right arrow
J	CHR\$(10) or down arrow
K	CHR\$(11)
L	CHR\$(12) or CLEAR
M	CHR\$(13) or ENTER
N	CHR\$(14)
O	CHR\$(15)
P	CHR\$(16)
Q	CHR\$(17)
R	CHR\$(18) or SHIFT-0
S	CHR\$(19)
T	CHR\$(20)
U	CHR\$(21) or SHIFT-left arrow
V	CHR\$(22)
W	CHR\$(23)
X	CHR\$(24)
Y	CHR\$(25)
Z	CHR\$(26)

* Keyboards with four function keys: Use F1 for ALT, F2 for CTRL, and F3 and F4 for F1 and F2.

Figure 1

(lines 460 through 470). The next 550 lines contain the code for the interrupt routine (NEWIRQ, for keyboard entry checking and print spooling); the output to the Speech Pak (SPEECH); for output to the screen (CHROUT); for spooler use (both PRINTR for entry of print data into the buffer and SERIRQ for spooler output to the printer); and the keyboard scan routine itself (POLKEY, POLCAT, NEW16A, GETKEY and NEW19A).

Now the screen print program (SCRKEY) is encountered. Since SCRKEY is called from POLKEY, the stack has to be reset in order for it to return correctly. Then Location \$FF22 is read. If it is >127 (negative), then the program goes to GRAPH. Otherwise the text screen is assumed to be seen, and text from \$400 to \$5FF is converted to ASCII format and sent to the printer. If it is a graphics screen, the starting address of the screen is assumed to be in Address \$BA (BASIC's screen pointer).

A page code, CHR\$(12), is sent to the printer, along with a half forward linefeed code. On most Tandy printers this is a CHR\$(27) plus CHR\$(28) combination; if yours is different, change lines 6480 and 6500 to LDA numbers, putting the codes after the number signs.

Then the old line length is saved, and the width is set for the graphics mode you are in. If it is one of the four-color modes, the program moves to COLOR for the dump. Otherwise, it produces a reversed screen image to the printer (white dots appear black). This can be changed by de-commenting (removing the asterisks) in lines 6930 and 7440.

Once the dump is done, the program restores the old line length and full linefeed. The codes used by Tandy are CHR\$(27) and CHR\$(54). If your printer uses different codes, change lines 7050 and 7070 the same way you did before.

In order to produce a large image, I decided to use the block graphics characters available on Tandy printers (lines 7660 through 7730). If your printer does not use the same codes (two codes per line, in Hex), replace them with codes corresponding to the low-resolution graphics characters (see *Getting Started With Color BASIC*). If your printer does not support these characters, the screen print routine will work only for the text mode. One possible solution is to add a graphics dump routine.

A note to Tandy printer owners: Look in your printer manual for details on the block graphics characters. Some print modes (Correspondence, etc.) do not allow graphics.

Details of the I/O Routines

Several changes were made to the printer routine, the first one being the addition of a print spooler. Memory locations &H9B and &H9C contain the carriage width (number of characters

per line) and the current printer head position. When the end of a line is reached, a carriage return, CHR\$(13), is sent. Also, locations &H97 and &H98 are the current page line number and the maximum page line number. When the

current page line number is equal to the maximum, a form feed, CHR\$(12), is sent. This way you won't print over the perforations in the printer paper. The page length (in Line 320) and the line length (second two digits of Line 290) can be from 01 to FF Hex (1 to 255 decimal) and can be changed without affecting the program's function. Also, the baud rate is set to 29 Hex (1200 baud) and can be changed for printers that handle faster baud rates. Replace the first two digits in Line 290 with the Hex value for the baud rate you want.

The Speech Pak output routine (lines 1470 through 1610) merely does what Radio Shack's program on Page 11 of the CoCo manual does, but now all you have to do is type:

```
PRINT #3, "HELLO"
```

and you will hear the computer say "hello." One interesting side effect of this is that Extended BASIC uses Device #3 for input from a modem. That could make writing terminal software considerably easier! The SPEECH routine itself keeps scanning Address &HFF7E until Bit 7 is set (ready to receive signal — >127). Then it sends a

The listing: KEYPOWER

7999		99199	ORG	97999
7999 BE	919D	99119 START	LDX	919D
7999 BF	7986	99129	STX	1+NEWRTI
7999 8E	79AF	99139	LDX	*NEWIRQ
7999 BF	919D	99149	STX	919D
7999 86	919C	99159	LDA	919C
7999 87	7985	99169	STA	NEWRTI
7912 BE	9168	99179	LDX	9168
7915 8F	79CC	99189	STX	1+NEW67
7918 8E	7986	99199	LDX	*NEW167
7918 8F	9168	99209	STX	9168
791E 86	9167	99219	LDA	9167
7921 B7	79C8	99229	STA	NEW67
7924 8E	9168	99239	LDX	9168
7927 BF	758B	99249	STX	1+NEW6A
792A 8E	7586	99259	LDX	*NEW16A
792D 8F	9168	99269	STX	9168
7939 86	916A	99279	LDA	916A
7933 87	758A	99289	STA	NEW6A
7936 CC	2959	99299	LDD	*92959
7939 97	96	99309	STA	<96
7938 D7	98	99319	STB	<98
793D CC	9949	99329	LDD	*949
7949 DD	97	99339	STD	<97
7942 8E	9128	99349	LDX	9128
7945 86	14	99359	LDA	*914
7947 198E	7987	99369	LDY	*NEW128 NEW TABLE LOCATION
7948 19BF	9128	99379	STY	9128
794F EE	81	99389	LDU	,X++
7951 EF	A1	99399	STU	,Y++
7953 4A		99409	DECA	
7954 26	F9	99419	BNE	91
7956 CE	75D3	99429	LDU	*INKEY
7959 EF	3C	99439	STU	-4,Y
7958 8E	75E6	99449	LDX	*NEW19A BETWEEN STATEMENTS BREAK CHECK

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character to the Speech Pak and returns.

The spooler routine is standard issue. After putting the character into a circular buffer, it updates the line position and page line values as necessary. The actual printing is done during an IRQ interrupt, where the routine checks to see if the printer is busy or not. If not, it will, if possible, pull a character out of the buffer and send it to the printer.

POLKEY is quite similar to BASIC's keyscan routine at \$A1C1, but the addition of the four keys and their functions required some overhauling. First, the SHIFT key is not masked from the rollover any longer, although pressing it alone will not return a code. The same holds true for the ALT and CTRL keys. For this reason, holding down one of these keys for more than a second and then pressing another key with it gives an instant repeat of that key.

Following the POLKEY routine is the POLCAT routine, which is called during the IRQ interrupt. First it calls POLKEY to see if a key has been pressed. If not, it returns. If the code returned is negative, the corresponding eight-character string is put into the keyboard

type-ahead buffer. Otherwise, the code returned is put into the buffer. The buffer will hold up to 128 characters. If the buffer is full, the speaker will beep a warning to you.

At Line 4170 the ALT keys are defined, starting with ALT-@. Each definition may be up to eight characters long, and the ASCII code of the last character must be 128 or greater for the program to recognize the end of its definition. Also, each definition must start on an even eight-byte boundary from ALTCHR. Thus, RMBs are used to fill up the rest of the unused bytes between definitions.

The function key definitions come at Line 5270 and may be up to 16 characters long. Therefore, they must come at even 16-byte boundaries to each other, again using RMBs.

NEW16A is called during the input routine and at the OK prompt. If the keyboard is being called for input, the routine will wait, with the cursor flashing, until the buffer has some characters in it. Once a key has been pressed, the cursor is erased and the buffer is updated, moving the buffer contents down one character. Then the keystroke is returned to the input routine.

NEW19A is the between-statements BREAK and SHIFT-@ check. The keyboard buffer is checked to see if a keypress has been made. If so, NEW19A checks to see if it was BREAK or SHIFT-@. If it was neither, it continues with the Extended BASIC routine at \$82C0 (for TRON tracing). If BREAK was pressed, the screen is restored to text and the spooler buffer is reset. The BASIC routine waits until another key is pressed, and then goes to the Extended BASIC between-statements routine.

Conclusion

Once you get this program up and running, you'll probably wonder how you got along without the use of your function keys. I also own a Tandy 1000, and it was the basis for my new keyboard driver. I must say, though, that even though that computer is supposed to run five times faster than the CoCo, it lacks the ease and friendliness of the CoCo.

(Questions or comments concerning this program may be directed to the author at 206 E. Main St., Elbridge, NY 13060. Please enclose an SASE when requesting a reply.) □

795E 8F	0198	00439	STX	\$198	79FA ED	81	00939	STD	,X++
7961 8E	7979	00469	LDX	NEW161	79FC 8C	0699	00949	CHPX	*\$699
7964 8F	0162	00479	STX	\$162	79FF 25	F3	00959	8LD	SCLOOP
7967 86	7E	00489	LDA	*\$7E	7101 35	96	00969	CONT1	PULS
7969 87	0167	00499	STA	\$167	7103 AF	61	00979	CHROUT	STX
796C 87	016A	00509	STA	\$16A	7105 34	02	00989	PSHS	A
796F 87	010C	00519	STA	\$10C	7107 9E	88	00999	LDX	<\$88
7972 87	019A	00529	STA	\$19A	7109 81	20	01009	CMFA	*\$20
7975 87	0161	00539	STA	\$161	710B 25	15	01019	8LD	CTRLCH
7978 39		00549	RTS		710D 4D		01029	TSTA	
7979 32	62	00559	NEW161	LEAS	710E 2B	0A	01039	8MI	CONT2
7978 C1	FD	00569	CHPB	*\$FD	7110 81	60	01049	CMFA	*\$60
797D 2D	05	00579	BLT	DNERR	7112 24	04	01059	8HS	*+6
797F C1	0F	00589	CHPB	*15	7114 8A	40	01069	ORA	*\$40
7981 2E	01	00599	BCT	DNERR	7116 20	02	01079	BRA	CONT2
7983 39		00609	RTS		7118 80	60	01089	SUBA	*\$60
7984 7E	A61F	00619	DNERR	JMP	711A A7	80	01099	CONT2	STA
7987		00629	NEW128	RMB	711C 9F	88	01109	STX	<\$88
79AF BD	7348	00639	NEW19Q	JSR	711E 20	AE	01119	BRA	SCR
79B2 8D	710F	00649	JSR	SERIRQ	7120 35	96	01129	CRTS	PULS
79B5 7E	8000	00659	NEWRTI	JMP	7122 81	98	01139	CTRLCH	CMFA
79B8 34	04	00669	NEW167	PSHS	7124 26	0F	01149	8NE	CONT3
79BA D6	6F	00679	LD8	<\$6F	7126 9E	88	01159	LDX	<\$88
79BC 27	45	00689	8EQ	CHROUT	7128 8C	0499	01169	CHPX	*\$499
79BE C1	FD	00699	CHPB	*\$FD	712B 27	F3	01179	BEQ	CRTS
79C0 1027	00A4	00709	LSAQ	SPEECH	712D 86	60	01189	LDA	*\$60
79C4 5C		00719	INCB		712F A7	82	01199	STA	,X
79C5 35	04	00729	PULS	B	7131 9F	88	01209	STX	<\$88
79C7 102B	00C2	00739	LBMI	PRINTR	7133 35	96	01219	PULS	A,B,X,PC
79CB 7E	8000	00749	NEW67	JMP	7135 81	0D	01229	CONT3	CMFA
79CE 8C	0600	00759	SCR	CHPX	7137 26	14	01239	8NE	C5
79D1 25	2E	00769	8LD	CONT1	7139 86	60	01249	LDA	*\$60
79D3 8E	0400	00779	LDX	*\$400	713B D6	89	01259	LD8	<\$89
79D6 EC	88 20	00789	SCROLL	LDD	713D C4	1F	01269	ANDB	*\$1F
79D9 ED	81	00799	STD	,X++	713F 50		01279	NEGB	
79DB EC	88 20	00809	LDD	32,X	7140 C8	20	01289	ADDB	*\$20
79DE ED	81	00819	STD	,X++	7142 9E	88	01299	LDX	<\$88
79E0 EC	88 20	00829	LDD	32,X	7144 A7	80	01309	CONT4	STA
79E3 ED	81	00839	STD	,X++	7146 5A		01319	DECB	
79E5 EC	88 20	00849	LDD	32,X	7147 26	FB	01329	8NE	CONT4
79E8 ED	81	00859	STD	,X++	7149 9F	88	01339	STX	<\$88
79EA 8C	05E0	00869	CHPX	*\$5E0	714B 20	81	01349	BRA	SCR
79ED 25	E7	00879	8LD	SCROLL	714D 81	0C	01359	C5	CMFA
79EF 9F	88	00889	STX	<\$88	714F 26	CF	01369	8NE	CRTS
79F1 CC	6060	00899	LDD	*\$6060	7151 8E	0499	01379	LDX	*\$499
79F4 ED	81	00909	SCLOOP	STD	7154 C0	6060	01389	LDD	*\$6060
79F6 ED	81	00919	STD	,X++	7157 9F	88	01399	STX	<\$88
79F8 ED	81	00929	STD	,X++	7159 ED	81	01409	C6	STD

715B ED	81	0141g	STD	,X++
7150 EO	81	0142g	STD	,X++
715F ED	81	0143g	STD	,X++
7161 8C	060g	0144g	CMFX	#560g
7164 25	F3	0145g	BLO	C6
7166 35	96	0146g	POLS	A,B,X,PC
7168 35	04	0147g	SPEECH	PULS
716A 32	62	0148g	LEAS	2,5
716C 7D	FF7E	0149g	SPWAIT	TST
716F 2A	FB	0150g	BPL	SPWAIT
7171 87	FF7E	0151g	STA	FF7E
7174 34	g2	0152g	PSHS	A
7176 86	FF01	0153g	LDA	FF01
7179 84	F7	0154g	ANDA	#5F7
717B 87	FF01	0155g	STA	FF01
717E 86	FF03	0156g	LDA	FF03
7181 8A	08	0157g	ORA	#8
7183 87	FF03	0158g	STA	FF03
7186 86	3C	0159g	LDA	#6g
7188 87	FF23	0160g	STA	FF23
718B 35	82	0161g	PULS	A,PC
718D AF	E4	0162g	PRINTR	STX
718F 34	03	0163g	SPOOL	PSHS
7191 8E	71DA	0164g	LDX	SPPOS
7194 1A	5g	0165g	ORCC	#55g
7196 A7	8g	0167g	STA	,X+
7198 8C	800g	0168g	CMFX	#800g
719B 25	03	0170g	BLO	SPRTS
719D 8E	7774	0171g	LDX	#8UFSTR
71A0 8F	71DA	0172g	SPRTS	STX
71A3 8C	71DC	0173g	WAITSP	CMFX
71A6 27	F8	0174g	BEQ	WAITSP
71AB 81	0D	0175g	UPDATE	CMFA
71AA 26	12	0176g	BNE	0P1
71AC 0F	9C	0177g	CLR	<\$9C
71AE 0C	97	0178g	INC	<\$97
71B0 96	97	0179g	LDA	<\$97
71B2 91	98	0180g	CMFA	<\$98
71B4 25	06	0181g	BLO	UPRTS
71B6 86	9C	0182g	LDA	#59C
71B8 AD	9F A002	0183g	JSR	[5A002]
71BC 35	93	0184g	DPRTS	PULS
71BE 81	9C	0185g	DPI	CMFA
71C0 26	06	0186g	BNE	UF2

71C2 0F	9C	0187g	CLR	<\$9C
71C4 0F	97	0188g	CLR	<\$97
71C6 35	93	0189g	PULS	A,X,CC,PC
71C8 9C	9C	0190g	UP2	INC
71CA 96	9C	0191g	LDA	<\$9C
71CC 91	93	0192g	CMFA	<\$98
71CE 25	EC	0193g	BLD	OPRTS
71D0 0F	9C	0194g	CLR	<\$9C
71D2 86	0D	0195g	LDA	#59D
71D4 AD	9F A002	0196g	JSR	[5A002]
71D8 35	93	0197g	PULS	A,X,CC,PC
71DA	7774	0198g	SPPOS	FDB
71DC	7774	0199g	SPSTR	FDB
71DE 39		0200g	SERRTI	RTS
71DF 86	FF22	0201g	SERIRQ	LDA
71E2 44		0202g	LSRA	
71E3 25	F9	0203g	BCS	SERRTI
71E5 8E	71DC	0204g	LDX	SPSTR
71EB 8C	71DA	0205g	CMFX	SPPOS
71EB 27	F1	0206g	BEQ	SERRTI
71ED A6	8g	0208g	LDA	,X+
71EF 8C	800g	0210g	CMFX	#800g
71F2 25	03	0211g	BLO	SERPRT
71F4 8E	7774	0212g	LDX	#8UFSTR
71F7 8F	710C	0213g	SERPRT	STX
71FA 8D	13	0214g	SERIAL	SSR
71FG 5F		0215g	CLR8	
71FD 8D	12	0216g	SSR	SENDBT
71FF C6	08	0217g	LDB	#8
7201 34	94	0218g	PSHS	B
7203 5F		0219g	SLOOP	CLR8
7204 44		0220g	LSRA	
7205 59		0221g	ROLS	
7206 58		0222g	ASLB	
7207 8D	08	0223g	SSR	SENDBT
7209 6A	E4	0224g	DEC	,S
720B 26	F6	0225g	BNE	SLOOP
720D 32	61	0226g	LEAS	1,S
720F C6	02	0227g	STOPBT	LDB
7211 F7	FF2g	0228g	SENDBT	STB
7214 9E	95	0229g	LDX	<\$95
7216 34	10	0230g	PSHS	X
7218 8D	7346	0231g	JSR	DELAY
721B 35	10	0232g	PULS	X

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Turn the page for more VIP software!

721D 16	0126	02330	LBRA	DELAY	
7220 32	7B	02340	POLKEY LEAS	.5,S	SET ASIDE STACK SPACE
7222 6F	63	02350	CLR	3,S	NO KEY HELD DOWN
7224 7A	7345	02360	DEC	TIMER	TIME HELD-1
7227 26	95	02370	8NE	POLL1	IF NOT HELD LONG ENOUGH FOR REPEAT
7229 86	93	02380	LDA	#93	REPEAT DELAY
7228 BD	7318	02390	JSR	RESET	RESET ROLLOVER TABLE FOR RECOGNITION
722E BE	0152	02400	POLL1 LDX	#\$152	ROLLOVER TABLE
7231 4F		02410	CLRA		
7232 4A		02420	DECA	A-.1	
7233 A7	E4	02430	STA	,S	SCAN #
7235 A7	62	02440	STA	2,S	ROW MASK
7237 A6	62	02450	POLL2 LDA	2,S	ROW MASK
7239 49		02460	ROLA		NEXT ROW
723A 1024	09AF	02470	LBHS	PDONE	IF NO KEY PRESSED
723E A7	62	02480	STA	2,S	SAVE NEW ROW MASK
7240 6C	E4	02490	INC	,S	NEXT SCAN ROW
7242 BD	7303	02500	JSR	SCAN	GET THIS ROW'S KEY PRESSES
7245 A7	61	02510	STA	1,S	SAVE BIT MASK
7247 A8	B4	02520	EDRA	,X	
7249 A4	84	02530	ANDA	,X	NO REPEAT(UNLESS TABLE RESET)
724B E6	61	02540	LDB	1,S	
724D E7	B9	02550	STB	,X*	NEW POLL VALUE
724F 5C		02560	INCB	+1	
7250 27	E5	02570	8EQ	POLL2	IF NO BITS OFF(KEY PRESS)
7252 6C	63	02580	INC	3,S	KEY PRESSED
7254 4D		02590	TSTA		
7255 27	E9	02600	BEQ	POLL2	IF ITS A KEY THAT IS BEING HELD DOWN, IGNOR
E IT					
7257 C6	F8	02610	LDB	#\$F8	.8
7259 CB	08	02620	POLL3 ADDB	#\$08	+8
725B 44		02630	LSRA		
725C 24	F8	02640	BHS	POLL3	LOOP UNTIL ROW*8 IS COMPUTED
725E 8E	7343	02650	LDX	#DELAY-3	POINT TO @ SIGN
7261 E8	E4	02660	ADDB	,S	ADD TO COL FOR SCAN CODE
7263 27	30	02670	BEQ	EXCEPT	IF @ SIGN KEY, IT'S AN EXCEPTION
7265 C1	1A	02680	CMFB	#\$1A	
7267 2F	1E	02690	8LE	LETTER	IF A-2
7269 8E	72F1	02700	LDX	#TSTART-\$36	
726C C1	20	02710	CMFB	#\$20	
726E 2F	25	02720	BLE	EXCEPT	IF ARROW KEYS OR SPACE BAR
7270 8E	72D3	02730	LDX	#TSTART-\$54	
7273 C1	30	02740	CMFB	#\$30	
7275 2C	1E	02750	BGE	EXCEPT	IF ENTER OR OTHER KEY
7277 BD	730C	02760	JSK	SHIFT	ELSE ITS CHR\$(33)-CHR\$(63),DO SHIFT CHECK
727A C1	28	02770	CMFB	#\$28	
727C 2F	02	02780	BLE	*+4	
727E 88	40	02790	EDRA	#\$40	

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Reviewed in
this month's
Rainbow!



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7280 4D		92800	TSTA		
7281 26	1A	92810	BNE	FINAL1	
7283 08	19	92820	ADDB	#510	
7285 20	16	92830	BR	FINAL1	
7287 CA	40	92840	LETTER	OR3	#540
7289 8D	730C	92850	JSR	SHIFT	
728C 8A	011A	92860	ORA	SILA	
728F 26	0C	92870	BNE	FINAL1	
7291 CA	20	92880	OR3	#520	SHIFTED LETTER
7293 20	38	92890	BRA	FINAL3	
7295 58		92900	EXCEPT	ASLB	2 CODES/KEY
7296 8D	74	92910	BSR	SHIFT	SHIFT KEY CHECK
7298 27	01	92920	BEQ	*+3	IF NOT PRESSED
729A 5C		92930	INCB		
7298 E6	85	92940	LDB	B,X	CHARACTER CODE RETURNED
729D CI	60	92950	FINAL1	CMPS	#560
729F 24	2C	92960	BRS	FINAL3	IF A LOWERCASE LETTER, NO ALT CODE FOR IT
72A1 CI	30	92970	CMPS	#530	
72A3 25	28	92980	SLO	FINAL3	IF LOWER THAN A #, NO CODE FOR IT EITHER
72A5 CI	40	92990	CMPS	#540	
72A7 25	0A	93000	SLO	ALT2	IF ITS A #, GET ITS CODE
72A9 86	F7	93010	ALTI	LDA	#5F7 ELSE DO
72AB 8D	61	93020	BSR	SHIFT+2	AN ALT CHECK
72AD 27	12	93030	BEQ	FINAL2	IF NOT PRESSED
72AF CB	40	93040	ADDB	#540	
72B1 20	1A	93050	BRA	FINAL3	RETURN AN ALT CODE
72B3 CI	30	93060	ALT2	CMPS	#530 > #
72B5 22	16	93070	BRI	FINAL3	YES
72B7 86	F7	93080	LDA	#5F7	ELSE DO AN
72B9 8D	53	93090	BSR	SHIFT+2	ALT CHECK
72BB 27	10	93100	BEQ	FINAL3	IF NOT PRESSED
72BD CB	6B	93110	ADDB	#568	ELSE RETURN AN ALT CODE
72BF 20	0C	93120	BRA	FINAL3	
72C1 86	EF	93130	FINAL2	LDA	#5EF DO A CTRL CHECK
72C3 8D	49	93140	BSR	SHIFT+2	
72C5 27	06	93150	BEQ	FINAL3	IF NOT PRESSED
72C7 00	40	93160	SUBB	#540	ELSE RETURNED IS 64 LESS
72C9 1027	0369	93170	LBEQ	SCRKEY	IF CTRL-@, DO A SCREEN DUMP
72CD E7	64	93180	FINAL3	STB	4,S SAVE ASCII CHARACTER
72CF 8E	045E	93190	LDA	#500E	
72D2 8D	7346	93200	JSR	DELAY	
72D5 86	FF	93210	LEA	#5FF	NO ROW MASK
72D7 8D	2A	93220	BSR	SCAN	
72D9 4C		93230	INCA		
72DA 26	11	93240	BNE	PDONE	IF KEY STILL BEING PRESSED
72DC A6	62	93250	LDA	2,S	ELSE MAYBE SCAN WAS A MISTAKE
72DE 8D	23	93260	BSR	SCAN	
72E0 A1	61	93270	CMPS	1,S	



Armchair Admiral



"Avast ye swabbies!" Roars Captain Blackbeard. "Hoist the Jolly Roger! When I gives the word, give 'em a broadside!" As Blackbeard's flotilla closes upon it's prey, a lookout suddenly cries, "Captain, a British Man-of-War!"

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VIP Writer

RATED "BEST" IN SEPT '88 "RAINBOW"

VIP Writer has all the features of VIP Writer III described elsewhere in this magazine except the screen widths are 32, 51, 64 & 85. Screen colors are black, green and white, double clock speed is not supported, Spooler is unavailable. Hard disk is not supported. Even so, VIP Writer is the BEST word processor for the CoCo 1 & 2! VIP Writer includes VIP Speller AT NO ADDITIONAL COST. DISK \$69.95

VIP Database

"ONE OF THE BEST" JULY 1984 "RAINBOW"

VIP Database has all the features of VIP Database III described elsewhere in this magazine except the screen widths are 51, 64 & 85. Screen colors are black, green and white, double clock speed is not supported, Spooler is unavailable. Even so, VIP Database is the most complete database for the CoCo 1 & 2! DISK \$49.95



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72E2 26	89	03280	BNE	PDONE	NO, IT WAS RIGHT, BUT KEY RELEASED
72E4 C1	12	03290	CMPE	#512	ELSE MAYBE IT WAS SHIFT-0
72E6 26	17	03300	BNE	PRTS	NO
72E8 73	011A	03310	COM	\$11A	ELSE SWITCH BETWEEN UPPER/LOWERCASE
72E8 20	19	03320	BPA	NOKEY	DON'T RETURN A KEY CODE FOR IT
72E0 60	63	03330	PDONE	TST	1,S
72EF 27	07	03340	BEQ	FD1	IFKEY NOT PRESSED
72F1 86	7345	03350	LDA	TIMER	
72F4 81	58	03360	CMPE	#55B	
72F6 26	05	03370	BNE	NOKEY	
72F8 86	5C	03380	PD1	LDA	#55C
72FA 80	731B	03390	JSR	RESET	
72FD 6F	64	03400	NOKEY	CLR	4,S
72FF 12	64	03410	PRTS	LEAS	4,S
7301 35	82	03420	PULS	A,PC	
7303 87	FF02	03430	SCAN	STA	\$FF02
7306 86	FF00	03440	LDA	\$FF00	
7309 8A	80	03450	ORA	#580	
730B 39		03460	RTS		
730C 86	7F	03470	SHIFT	LDA	#57F
730E 87	FF02	03480	STA	\$FF02	
7311 86	FF00	03490	LDA	\$FF00	
7314 43		03500	COMA		
7315 84	40	03510	ANDA	#540	
7317 39		03520	RTS		
7318 87	7345	03530	RESET	STA	TIMER
731B CC	FF00	03540	LDD	#FF00	
731E 8E	0152	03550	LDX	#5152	
7321 A7	80	03560	RLODF	STA	,X+
7323 5A		03570	DECS		
7324 26	FB	03580	BNE	RLOOF	
7326 39		03590	RTS		
7327	5E5F	03600	TSTART	FDB	\$5E5F
7329	0A5B	03610	FDB	\$0A5B	
732B	0815	03620	FDB	\$0815	
732D	095D	03630	FDB	\$095D	
732F	2020	03640	FDB	\$2020	
7331	3012	03650	FDB	\$3012	
7333	0000	03660	FDB	\$0000	
7335	0C5C	03670	FDB	\$0C5C	
7337	0303	03680	FDB	\$0303	
7339	0000	03690	FDB	\$0000	
733B	0000	03700	FDB	\$0000	
733D	A5A9	03710	FDB	\$A5A9	
733F	A7AB	03720	FDB	\$A7AB	
7341	0000	03730	FDB	\$0000	
7343	4013	03740	FDB	\$4013	
7345	5C	03750	TIMER	FCB	\$5C
7346 30	1F	03760	DELAY	LEAX	-1,X
7348 26	FC	03770	BNE	DELAY	
734A 39		03780	RTS		
734B 8D	7220	03790	POLCAT	JSR	POLKEY
734E 40		03800	TSTA		
734F 27	0F	03810	BEQ	BEEP-1	
7351 2B	31	03820	BMI	FILLBF	
7353 F6	739D	03830	PUTBDF	LDB	MUMCHR
7356 2B	09	03840	BMI	BEEP	
7358 7C	739D	03850	INC	MUMCHR	
735B 8E	739E	03860	LDB	#CHRBUF	
735E A7	85	03870	STA	B,X	
7360 39		03880	RTS		
7361 B6	FF23	03890	BEEP	LDA	\$FF23
7364 B4	F3	03900	ANDA	#5F3	
7366 B7	FF23	03910	STA	\$FF23	
7369 F6	FF22	03920	LDB	\$FF22	
736C CA	02	03930	ORB	#502	
736E F7	FF22	03940	STB	\$FF22	
7371 8A	04	03950	ORA	#504	
7373 87	FF23	03960	STA	\$FF23	
7376 86	40	03970	LDA	#540	
7378 F6	FF22	03980	LDB	\$FF22	
737B C8	02	03990	BLDDP1	EDRB	#502
737D F7	FF22	04000	STB	\$FF22	
7380 4A		04010	DECA		
7381 26	FB	04020	BNE	BLOOF1	
7383 39		04030	RTS		
7384 C6	08	04040	FILLBF	LDB	#B
7386 B0	80	04050	SUBA	#5B0	
738B 3D		04060	MUL		
7389 108E	741E	04070	LDY	#ALTCHR	
738D 31	AB	04080	LEAY	D,Y	
738F A6	A0	04090	FLOOF1	LDA	,Y+
7391 2B	05	04100	BMI	FNEXT1	
7393 BD	7353	04110	JSR	PUTBUF	
7396 20	F7	04120	BRA	FLOOF1	
739B 84	7F	04130	FNEXT1	ANDA	#57F
739A 16	FF16	04140	LBRA	PUTBUF	
739D	00	04150	MUMCHR	FCB	0
739E		04160	CHRBUF	RMB	128
741E	50	04170	ALTCHR	FCC	/PRINT/
	52				
	49				
	4E				
	54				
7423	C0	04180	FCB	\$C0	
7424		04190	RMB	2	
7426	41	04200	FCC	/ATN/	
	54				
	4E				
7429	AB	04210	FCB	\$AB	
742A		04220	RMB	4	

742E	42	04230	FCC	/BACKU/
	41			
	43			
	4B			
	55			
7433	D0	04240	FCB	\$D0
7434		04250	RMB	2
7436	43	04260	FCC	/COS/
	4F			
	53			
7439	A8	04270	FCB	\$A8
743A		04280	RMB	4
743E	44	04290	FCC	/DAT/
	41			
	54			
7441	C1	04300	FCB	\$C1
7442		04310	RMB	4
7446	45	04320	FCC	/EDI/
	44			
	49			
7449	D4	04330	FCB	\$D4
744A		04340	RMB	4
744E	46	04350	FCC	/FILE/
	49			
	4C			
	45			
7452	D3	04360	FCB	\$D3
7453		04370	RMB	3
7456	47	04380	FCC	/COT/
	4F			
	54			
7459	CF	04390	FCB	\$CF
745A		04400	RMB	4
745E	48	04410	FCC	/HEX\$/
	45			
	58			
	24			
7462	A8	04420	FCB	\$A8
7463		04430	RMB	3
7466	49	04440	FCC	/INPU/
	4E			
	50			
	55			
746A	D4	04450	FCB	\$D4
746B		04460	RMB	3
746E	4A	04470	FCC	/JDYSTK/
	4F			
	59			
	53			
	54			
	48			
7474	AB	04480	FCB	\$AB
7475		04490	RMB	1
7476	4B	04500	FCC	/KIL/
	49			
	4C			
7479	CC	04510	FCB	\$CC
747A		04520	RMB	4
747E	4C	04530	FCC	/LINE/
	49			
	4E			
	45			
7482	AB	04540	FCB	\$AB
7483		04550	RMB	3
7486	4D	04560	FCC	/NE/
	45			
748B	CD	04570	FCB	\$CD
7489		04580	RMB	5
748E	4E	04590	FCC	/NE/
	45			
7490	D7	04600	FCB	\$D7
7491		04610	RMB	5
7496	4F	04620	FCC	/OPE/
	50			
	45			
7499	CE	04630	FCB	\$CE
749A		04640	RMB	4
749E	50	04650	FCC	/PRIN/
	52			
	49			
	4E			
74A2	D4	04660	FCB	\$D4
74A3		04670	RMB	3
74A6	50	04680	FCC	/FSET/
	53			
	45			
	54			
74AA	A8	04690	FCB	\$A8
74AB		04700	RMB	3
74AE	50	04710	FCC	/PRESET/
	52			
	45			
	53			
	54			
74B4	A8	04720	FCB	\$A8
74B5		04730	RMB	1
74B6	53	04740	FCC	/SIN/
	49			
	4E			
74B9	AB	04750	FCB	\$AB

74BA		94769	RMB	4	
74BE	54	94779	FCC	/TAN/	
	41				
	4E				
74C1	A8	94789	FCB	\$A8	
74C2		94799	RMB	4	
74C6	55	94809	FCC	/USIN/	
	53				
	49				
	4E				
74CA	C7	94819	FCB	\$C7	
74CB		94829	RMB	3	
74CE	56	94839	FCC	/VERIF/	
	45				
	52				
	49				
	46				
74D3	D9	94849	FCB	\$D9	
74D4		94859	RMB	2	
74D6	57	94869	FCC	/WRITE/	
	52				
	49				
	54				
	45				
74D8	A3	94879	FCB	\$A3	
74DC		94889	RMB	2	
74DE	59	94899	FCC	/PEEK/	
	45				
	45				
	4B				
74E2	A8	94909	FCB	\$A8	
74E3		94919	RMB	3	
74E6	59	94929	FCC	/POK/	
	4F				
	4B				
74E9	C5	94939	FCB	\$C5	
74EA		94949	RMB	4	
74EE	59	94959	FCC	/XPOINT/	
	59				
	4F				
	49				
	4E				
	54				
74F4	A8	94969	FCB	\$A8	
74F5		94979	RMB	1	
74F6	52	94989	FCC	/RND(9/	
	4E				
	44				

	28				
	39				
74FB	A9	94999	FCB	\$A9	
74FC		95009	RMB	2	
74FE	23	95019	FCC	/W-1/	
	2D				
	31				
7501	AC	95029	FCB	\$AC	
7502		95039	RMB	4	
7506	23	95049	FCC	/W-2/	
	2D				
	32				
7509	AC	95059	FCB	\$AC	
750A		95069	RMB	4	
750E	23	95079	FCC	/W-3/	
	2D				
	33				
7511	AC	95089	FCB	\$AC	
7512		95099	RMB	4	
7516	26	95109	FCC	/B-/	
7517	C8	95119	FCB	\$C8	
7518		95129	RMB	6	
751E	26	95139	FCC	/B-/	
751F	CF	95149	FCB	\$CF	
7529		95159	RMB	6	
7526	43	95169	FCC	/CHRS/	
	48				
	52				
	24				
752A	A8	95179	FCB	\$A8	
752B		95189	RMB	3	
752E	53	95199	FCC	/STRINGS/	
	54				
	52				
	49				
	4E				
	47				
	24				
7535	A8	95209	FCB	\$A8	
7536	49	95219	FCC	/INSTR/	
	4E				
	53				
	54				
	52				
753B	A8	95229	FCB	\$A8	
753C		95239	RMB	2	
753E	4D	95249	FCC	/MDS/	
	49				

★ ★ ★ NEW ★ ★ ★

BASH by Steve Bjork

Based on a popular arcade game which we can't mention (But sounds like "Art Gannoyed"), BASH challenges you to clear the screen by "BASHING" your ball through multiple brick layers. Of course you'll have help getting through this 20 level game by activating options like, Slow Ball, Expanded Paddle, Multi-Ball and more!

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WARP FIGHTER 3-D by Steve Bjork

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MINE RESCUE by Steve Bjork

A terrible mine disaster has just occurred and it will be up to you and your talents to enter the mine, jump the pits, avoid the spikes, fight off the bats and other creepy crawlers and get air to the needy victims. Mine rescue features over 2 megabytes of arcade-style graphics, real time music and multiple mine levels. Hours of fun!

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THE RAINBOW October 1988

THE RAINBOW October 1988

```

76CD 27 02 06870 BEQ M3
76CF 8A 04 06880 ORA #004
76D1 E5 88 20 06890 M3 BITB 32,X
76D4 27 01 06900 BEQ M4
76D6 4C 00 06910 INCA
76D7 00 06920 M4
06930 * EORA #00F DE-COMMENT THIS IF Y

```

DO WANT THE OUTPUT INVE

RTED(WHITE LINES)

```

76D7 A6 C6 06940 LDA A,U
76D9 AD 9F A002 06950 JSR [A002]
76DD 54 00 06960 LSRB
76DE 26 DC 06970 BNE HLOOP3
76E0 30 01 06980 LEAX 1,X
76E2 6A E4 06990 DEC ,S
76E4 26 D4 07000 BNE HLOOP2
76E6 E6 61 07010 LDB 1,S
76E8 3A 00 07020 ABX
76E9 6A 62 07030 DEC 2,S
76EB 26 C9 07040 BNE HLOOP1
76ED 86 IB 07050 FULL LDA #27
76EF AD 9F A002 07060 JSR [A002]
76F3 48 00 07070 LSLA
76F4 AD 9E A002 07080 JSR [A002]
76F8 EC 63 07090 LDD 3,S
76FA 32 65 07100 LEAS 5,S
76FC 97 9B 07110 STA <09B
76FE 97 6F 07120 STA <06F
7700 4F 00 07130 CLRA
7701 84 98 07140 LSR <09B
7703 04 97 07150 LSR <097
7705 39 00 07160 RTS
7706 04 9B 07170 COLOR LSR <09B
7708 EC 84 07180 LDD ,X
770A 34 06 07190 PSHS D
770C 34 02 07200 PSHS A
770E 8E 7764 07210 LDY #CTABLE+16
7710 B7 7728 07220 STA C1+2
7712 B7 7737 07230 STA C3+2
7714 08 98 07240 LSL <09B
7716 A6 61 07250 CLOOP1 LDA 1,S
7718 A7 E4 07260 STA ,S
771A C6 C0 07270 CLOOP2 LDB #0C0
771C 4F 00 07280 CLOOP3 CLRA
771E E5 84 07290 BITB ,X
7720 27 02 07300 BEQ C1
7722 8A 08 07310 ORA #8
7724 E5 88 20 07320 C1 BITB 32,X
7726 27 02 07330 BEQ C2
7728 8A 02 07340 ORA #2
772A 54 00 07350 C2 LSRB
772C 54 00 07360 LSRB
772E E5 84 07370 BITB ,X
7730 27 02 07380 BEQ C3
7732 8A 04 07390 ORA #4
7734 E5 88 20 07400 C3 BITB 32,X
7736 27 01 07410 BEQ C4
7738 4C 00 07420 INCA
773A 00 07430 C4
773B 00 07440 * EORA #00F DE-COMMENT THIS I

```

IF YOU WANT THE OUTPUT INVE

RTED

```

773B A6 C6 07450 LDA A,U
773D AD 9F A002 07460 JSR [A002]
7741 54 00 07470 LSRB
7742 54 00 07480 LSRB
7744 26 DA 07490 BNE CLOOP3
7746 30 01 07500 LEAX 1,X
7748 6A E4 07510 DEC ,S
774A 26 D2 07520 BNE CLOOP2
774C E6 61 07530 LDB 1,S
774E 3A 00 07540 ABX
7750 6A 62 07550 DEC 2,S
7752 26 C7 07560 BNE CLOOP1
7754 20 99 07570 BRA FULL
7756 1020 07580 CTABLE FDB $1020
7758 2020 07590 FDB $2020
775A 1030 07600 FDB $1030
775C 2030 07610 FDB $2030
775E 1060 07620 FDB $1060
7760 2060 07630 FDB $2060
7762 2060 07640 FDB $2060
7764 E0E4 07650 FDB $E0E4
7766 E0E8 07660 FDB $E0E8
7768 E2EA 07670 FDB $E2EA
776A E6EE 07680 FDB $E6EE
776C E1E5 07690 FDB $E1E5
776E E9ED 07700 FDB $E9ED
7770 E7EC 07710 FDB $E7EC
7772 EBEF 07720 FDB $EBEF
7774 00 07730 BUFSTR
7775 00 07740 END START

```

00000 TOTAL ERRORS

Hint...

Windows Three

Here are three handy screens to keep on your work disks to call when you want to develop a new procedure or run an old one. Use the BASIC09 editor to create the three procedures. Note: The vdgint command is not usually found on the System disk supplied but is in the MODULES directory of the Configuration disk. You will need it in your commands directory if you want to call up a 32-column screen.

A 32-column CoCo 1 and 2 Screen

```

PROCEDURE scrn32
SHELL "load vdgint"
SHELL "deiniz /w3"
SHELL "xmode /w3 type=1 pag=16"
SHELL "shell i=/w3&"
PRINT "Press <CLEAR. . ."

```

A 40-column CoCo 3 Graphics Screen

```

PROCEDURE scrn40
DIM path: INTEGER
SHELL "iniz /w1"
OPEN #path,"/w1":WRITE
RUN gfx2(path,"DWSET",6,0,0,40,24,0,1,1)
SHELL "merge sys/stdfonts >/w1"
SHELL "merge sys/stdptrs >/w1"
SHELL "merge sys/stdpats_4 >/w1"
SHELL "display 1b 3a c8 01>/w1"
RUN gfx2(path,"SELECT")
SHELL "shell i=/w1&"
SHELL "shell"

```

An 80-column CoCo 3 Graphics Screen

```

PROCEDURE scrn80
DIM path: INTEGER
SHELL "iniz /w2"
OPEN #path,"/w2":WRITE
RUN gfx2(path,"DWSET",7,0,0,80,24,0,1,1)
SHELL "merge sys/stdfonts >/w2"
SHELL "merge sys/stdptrs >/w2"
SHELL "merge sys/stdpats_4 >/w2"
SHELL "display 1b 3a c8 01>/w2"
RUN gfx2(path,"SELECT")
SHELL "shell i=/w2&"
SHELL "shell"

```

At the BASIC09 B prompt, save each screen separately as source code that ends up in your root directory (/D0); e.g., save scrn32. Then pack each of them separately as packed code, which ends up in your commands directory (/D0/CMDS); e.g., pack scrn32. You may then call a screen by typing, say, scrn40 at the OS-9 prompt, or by typing %scrn40 at the BASIC09 prompt.

By keeping the source code in your root directory, you can amend the features of any of the screens by loading the code into BASIC09. For instance, you might want to change the scrn40 blue color to black by editing RUN gfx2(path,"DWSET",6,0,0,40,24,0,1,1) to read RUN gfx2(path,"DWSET",6,0,0,40,24,0,2,1).

Del Turner, Kamloops, BC

Corrections

"Barden's Buffer" (August 1988, Page 170): Bill Barden has written to make a few points about his timing program. In Mr. Barden's words, "Art Flexser, author of ADOS, correctly points out that the timing program will work only under Radio Shack Disk BASIC 1.1. He [Art Flexser] also adds a few suggestions: 1) Use POKE&HFF03,&H34 to disable the interrupts from BASIC and POKE&HFF03,&H35 to enable them, 2) Use an DREC instruction to disable and enable the interrupts in assembly language rather than a TFR (a TFR will work, however.)"

"The Old Switcheroo II" (August 1988, Page 120): Mark Haverstock wrote to correct some errors in part numbers given in his article. The correct Radio Shack catalog number for the experimenter's box is 270-030, not 270-2301. Similarly, the number for the five-pin in-line DIN jack is 274-006, not 274-005.

"Flight Simulator II" (Review, August 1988): The correct price for *Flight Simulator II* is \$34.95, not \$24.95 as stated in the review. The program is available only through Radio Shack and cannot be purchased directly from SubLOGIC.

"Escape From Tut's Tomb" (August 1988, Page 58): Due to a production error, part of the listing for 2PART1 is missing from the printed magazine. The missing portions are reproduced below. The files on RAINBOW ON TAPE and RAINBOW ON DISK are unaffected and include the complete program.

```
690 DATA 32,3,15,14,7,18,1,20
700 DATA 21,12,1,20,9,15,14,19
710 DATA 32,6,9,14,9,19,8,5
720 DATA 4,32,16,1,18,20,20,23
730 DATA 15,12,15,1,4,32,14,5
740 DATA 24,20,32,16,1,18,20,0
750 DATA 0,0,0,0,0,0,0,0
760 DATA 0,0,0,0,0,0,0,0
770 DATA 0,0,0,0,0,134,255,183
780 DATA 43,196,183,43,197,183,4
3,198
790 DATA 183,43,199,183,43,164,1
83,43
800 DATA 165,183,43,166,183,43,1
67,57
810 DATA 182,15,160,129,56,38,10
0,182
820 DATA 30,220,177,30,230,34,32
,37
```

```
830 DATA 54,182,30,221,177,30,23
1,34
840 DATA 22,37,44,182,30,222,177
,30
850 DATA 232,34,12,37,34,182,30,
223
860 DATA 177,30,233,34,2,32,24,1
82
870 DATA 30,220,183,30,230,182,3
0,221
880 DATA 183,30,231,182,30,222,1
83,30
890 DATA 232,182,30,223,183,30,2
33,189
900 DATA 21,224,189,21,224,134,3
,183
910 DATA 30,237,182,15,161,183,3
0,220
920 DATA 182,15,162,183,30,221,1
82,15
930 DATA 163,183,30,222,182,15,1
64,183
940 DATA 30,223,57,63,4,0,0,0
950 DATA 0,0,4,0,4,0,4,0
960 DATA 4,0,0,0,0,0,0,0
970 DATA 0,0,0,0,0,0,0,0
980 DATA 194,251,255,255,255,255
,255,255
990 DATA 255,187,185,197,161,222
,7,255
1000 DATA 82,161,197,11,0,0,171,
238
1010 DATA 161,181,1,2,221,161,16
1,2
1020 DATA 4,160,240,0,255,255,25
5,255
1030 DATA 255,255,255,255,255,25
5,255,255
1040 DATA 255,255,255,255,255,25
5,255,255
1050 DATA 255,255,255,255,255,25
5,255,255
```

For quicker reference, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type DATA at the CoCo SIG> prompt and INFO at the TOPIC> prompt.

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We're Looking for a Few Good Shorties

Help! The Niche needs more submissions! If you have written a good shortie, please send it in. We're looking for graphics, utilities, educational programs and games (especially games!). How short is a shortie? Well, if you printed out your listing in 32 columns, as we do, it should fit on one half of an 8½-by-11 inch page (be under 12 inches). (Entering PRINT#-2,CHR\$(27)CHR\$(81)CHR\$(32) will allow most Epson-compatible printers to LIST a program in 32 columns if you want to check this.)

Graphics

Fright Night

By Patricia Moos

16K
ECB

Spook is a short but flashy Halloween program. It draws a jack-o'-lantern on the PMODE 3 graphics screen, then starts playing an eerie tune. At first the music is slow, but as it repeats it plays faster and faster. Finally, the music stops and the image flashes.

Because of the GOTO 230 statement in Line 270, the pumpkin will flash endlessly after it finishes its song. If you would like your jack-o'-lantern to run endlessly from start to finish, replace Line 270's GOTO 230 statement with GOTO 10 and add these two lines:

```
225 FOR T=1 TO 20
265 NEXT T
```

Put the monitor in your window and share the specter with trick-or-treaters on Halloween night.

The listing: SPOOK

```
10 PMODE 3,1
20 PCLS
30 SCREEN 1,1
40 CIRCLE(128,96),95,8
50 CIRCLE(128,96),60,8,1,0,.08
60 DRAW"BM183,118;H10;G10;F14"
70 CIRCLE(128,96),60,8,1,.10,.18
80 DRAW"BM158,143;U15;L15;D25"
90 CIRCLE(128,96),60,8,1,.21,.32
100 DRAW"BM108,150;E10;H10;G14"
110 CIRCLE(128,96),60,8,1,.35,.4
120 DRAW"BM78,128;E10;H10;G5"
130 CIRCLE(128,96),60,8,1,.46,.5
140 CIRCLE(128,74),75,8,.50,.10,
    .20
150 DRAW"BM156,107;D10;L20;U8"
160 CIRCLE(128,74),75,8,.50,.24,
```



```
.27
170 DRAW"BM125,111;D10;L20;U12
180 CIRCLE(128,74),75,8,.50,.31,
    .40
190 DRAW"BM80,70;E20;F20;L37"
200 DRAW"BM140,70;E20;F20;L37"
210 PAINT(100,40),8,8
215 PAINT(1,1),6,8
220 GOSUB 290
230 PMODE 4,1:SCREEN1,1
240 FOR X=1TO100:NEXT X
250 PMODE 3,1:SCREEN1,1
260 FORX=1TO100:NEXT X
270 GOTO230
290 B$="P4;E#;D;E+;P4;D+;C;D+;P4
    "
300 C$="O4;C;O3;A+;G;E-;G;A+;P2"
310 D$="T3;C;D;E-;F;G;D+G;"
320 E$="T4;C;D;E-;F;G;D+G;"
327 G$="T7;C;D;E-;F;G;D+;G"
328 H$="T10;C;D;E-;F;G;D+;G"
329 I$="T15;C;D;E-;F;G;D+;G"
340 PLAY D$+B$+D$+C$
350 PLAY E$+B$+E$+C$
370 PLAY G$+B$+G$+C$
380 PLAY H$+B$+H$+C$
390 PLAY I$+B$+I$+C$
400 RETURN
```

Ad Infinitum

By Rick Weshenfelder

CoCo 3

If you're one of those people who liked the Lava Lamp, you'll love *Eyecatcher*. Just type in, load and run the program to see an infinite number of CoCo 3 graphics. Press any key to start the program over again.

I used the speed-up poke (POKE 65497,0) because the program has to do quite a bit of number crunching. (Note: CoCo 2 users should use the CoCo 2-specific speed-up poke in translating this program to their machines.)

If you like to fiddle with the programs you type in, you might try changing the values of some of the variables to see what will happen. F controls the spacing between lines as they are drawn. TI controls how often the colors will change, and TM is responsible for resetting the program. There are more, but these will do for a start.

If you want to tinker more with the program, I have some suggestions. Try, for example, adding a routine to let the number keys change the background color. Remove the variable TM entirely for a continuous picture, or make an option that switches between continuous and timed pictures.

The listing: EYECATCH

```
10 '>>> EYE CATCHER <<<
20 ' RICK WESHENFELDER
30 CLS:POKE65497,0:ONBRKGOTO180:
```

```
TIMER=0
40 WIDTH80:PALETTE$=PALETTE0,0
:HSCREEN2:HCOLOR1,0
50 F=2:F1=.995^F:F2=1-F1
60 HA=RND(320):HB=RND(320):VA=RN
D(192):VB=RND(192)
70 H1=RND(0)*SGN(160-HA):V1=(1-A
BS(H1))*SGN(96-VA)
80 H1=H1*F:V1=V1*F
90 PC=RND(8):PALETTE(8+PC)-1,(PC
*8)-1:TI=TIMER:IFTI>=50THENTI=0:
TIMER=0:TM=TM+1:HC=(HC+1)*-(HC<1
5)
100 IFTM=5THENTM=0:HCLS:GOTO50
110 IF HA+H1>319 OR HA+H1<0 THEN
HA=HA-H1:HCOLORHC,0:GOTO70
120 IF VA+V1>191 OR VA+V1<0 THEN
VA=VA-V1:HCOLORHC,0:GOTO70
130 HA=HA+H1:VA=VA+V1:HB=HB*F1+H
A*F2:VB=VB*F1+VA*F2
140 HLINE(HA,VA)-(HB,VB),PSET
150 HLINE(319-HB,VB)-(319-HA,VA)
,PSET
160 HSET(HA,VA,15-HC):HSET(HB,VB
,15-HC):HSET(319-HA,VA,15-HC):H
SET(319-HB,VB,15-HC)
170 IFINKEY$=""THEN110ELSEHCLS:T
IMER=0:TM=0:GOTO50
180 POKE65496,0:PALETTE0,32:WIDT
H32:PALETTE$=END
```

Tying up DRAW Strings

By Keiran Kenny

32K
ECB

With *CopyPix* you can use LINEINPUT to enter DRAW commands and see what you have drawn as soon as you press ENTER.

On running the program you will see a text screen with the word *Draw* at the upper-left corner. Type in one of the DRAW commands (U15, for example — see your Extended Color BASIC manual) and press ENTER. The program then shifts you to the PMODE 4 screen to show what you have done. Pressing the space bar returns you to the text screen for another prompt. Add a few more commands, press ENTER again, and watch your drawing grow. You can enter DRAW strings up to a maximum of about four text screen lines in length, but you may find that entering commands one to four at a time is preferable.

When the program starts, the cursor is at the center of the screen (128,96). Enter a BM or B command if you want to change the cursor position at any time. Otherwise, each new line will follow on from the end of the last line you drew.

If a cassette recorder is connected to your CoCo, you can save your pictures to tape. To save a picture, position the tape and enter SP (save picture) at the LINEINPUT prompt, then press Record and Play. To load a saved picture, position your tape and enter LP (load picture), then press Play on the recorder. (Do not put space between the DRAW prompt and either SP or LP; doing so will result in an error.) When you load a picture from tape, the cursor will be at Position 128,96.

The listing: COPYPIX

```
0 'COPYPIX' BY KEIRAN KENNY,
SYDNEY, 1988.
10 CLS
20 GOTO170
30 LINEINPUT"DRAW";D$
40 IFD$="SP"THENPMODE4,1:COLOR0,
1:PCLS:SCREEN1,1:GOSUB80:CSAVEM"
",PEEK(&HBA)*256,PEEK(&HB7)*256-
1,&HB44A:GOTO150
50 IFD$="LP"THENN=0:PMODE4,1:COL
OR0,5:PCLS:SCREEN1,1:CLOADM:GOTO
120
60 PMODE4,1:COLOR0,5:PCLS:SCREEN
1,1
70 IFN THENGOSUB80:GOTO110ELSE11
0
80 PG=1
90 FORT=5TO8:PCOPYT TOPG:PG=PG+1
:NEXT
100 RETURN
110 DRAW$
120 N=1
130 PG=5
140 FORT=1TO4:PCOPYT TOPG:PG=PG+
1:NEXT
150 K$=INKEY$:IFK$<>CHR$(32)THEN
150
160 GOTO30
170 PCLEAR8:GOTO30
```


Seeing the Bigger Picture

By Erich Sweeney

CoCo 3

CoCo Plus is a short program that increases the CoCo 3's HSCREEN 2 or 4 screen by six vertical pixels (from 192 to 198). To use 198 vertical pixels in your own programs, type in lines 40 and 70 every time you use the HSCREEN 2 or 4 command.

The HCIRCLE command does not work properly when you enter it between vertical locations 192 and 198, and the HPAINT command requires a little experimentation, but all the other commands work fine. Type in and run this listing for a demonstration.

The listing: COCOPLUS

```

Ø REM COCO PLUS
1Ø REM INCREASES GRAPHICS FOR TH
E COCO 3 FROM 192 TO 198
2Ø REM BY ERICH SWEANEY
3Ø PALETTE RGB
4Ø HSCREEN 2:POKE &HFF98,128:POK
E &HFF99,62
5Ø REM MAKES SCREEN LARGER
6Ø REM CHANGE POKE &HFF99,62 TO
POKE &HFF99,61 TO USE HSCREEN 4
7Ø POKE &HE7BA,2Ø1
8Ø REM LET'S HLINE GOTO 198
9Ø HCLS8
1ØØ PALETTE 7,37
11Ø HCOLOR 7
12Ø HLINE(Ø,Ø)-(32Ø,198),PSET,B

```

```

13Ø HCOLOR 2:HLINE(Ø,Ø)-(32Ø,192
),PSET,B
14Ø HPRINT(2,23),"OLD 192":HCOLO
R 7:HPRINT(2Ø,24),"NEW 198"
15Ø HCOLOR 3:HLINE(Ø,192)-(32Ø,1
98),PSET,B
16Ø HPAINT(1Ø,197),4,3
17Ø REM YOU MUST SET THE LOWEST
POINT DOWN,WHEN HPAINTING BETWEE
N 192-198 OR IT WONT WORK WRIGHT
18Ø HCOLOR 2:HCIRCLE(25Ø,194),1Ø
19Ø REM SORRY HCIRCLE DOES NOT W
ORK GOOD
2ØØ REM MOST OTHER HSCREEN GRAPH
IC COMMANDS WORK
21Ø REM TO USE HSCREEN 2,4 IN YO
UR PROGRAMS JUST TYPE LINE 1Ø AN
D 4Ø IN WHEN EVER YOU USE HSCREE
N
22Ø HPRINT(2,2),"NEW GRAPHICS CA
PABILTY"
23Ø HCOLOR 5:HPRINT(2,3),"FOR HS
CREEN 2 AND 4"
24Ø HCOLOR 4:HPRINT(2,4),"CHANGE
S FROM 192 TO 198"
25Ø HCOLOR 6:HPRINT(2,5),"BY"
26Ø HCOLOR 7:HPRINT(2,6),"ERICH
SWEANEY"
27Ø POKE 65497,Ø:FOR L=Ø TO 3ØØ
STEP 2:HCOLOR RND(8):HLINE(L,8Ø)
-(L+2Ø,18Ø),PSET:HLINE(L,18Ø)-(L
+5Ø,8Ø),PSET:NEXT L
28Ø GOTO 28Ø

```

Taking on the One-Armed Bandit

By Kenneth Carlin

4K

I recently rediscovered a game I had written more than five years ago that is still fun to play (and it will run on *every* CoCo there is, from the old 4K non-extended all the way to the 512K CoCo 3) — it's a Low-Res interpretation of the classic slot machine.

Game play is extremely simple. After the title screen, you are prompted to press P to play the game; this constantly seeds the random number generator with new values, ensuring a completely new game every time. You are then prompted for a bet between one and five tokens. The windows

will flash random blocks of graphics, simulating the spin of the wheel. If the symbols match after the machine has stopped, you win. Payoff is as follows:

Window	Payoff
yellow in 1st	2x
yellow in 1st and 2nd	5x
3 blue or 2 blue and a bar	10x
3 red or 2 red and a bar	20x
3 white or 2 white and a bar	35x
3 cyan or 2 cyan and a bar	50x
3 magenta or 2 magenta and a bar	100x
3 orange or 2 orange and a bar	200x

In case you hadn't guessed, the bar mentioned above is the

***** in Window 3. With any winning combination, the payoff is flashed on the screen along with the message "Winner!" Play ceases only when you run out of money or grow tired of playing.

There are a few things you may want to add to this game to make it more enjoyable. Personally, I like to pull back on some sort of "arm" when I play a slot machine. If you have a joystick, you can incorporate it into the program by following a few short steps. First, retype Line 28 so that it reads as follows:

```
28 Q=JOYSTK(0):IFJOYSTK(1)>30THE
NPRINT@389," PLEASE RESET THE AR
M":GOTO28
```

Now retype Line 29 to read:

```
29 PRINT@389," PULL THE ARM BAC
K":Z=JOYSTK(0):IFJOYSTK(1)<>63TH
EN29ELSEPRINT@340,"GOTO4
```

These two changes allow the joystick to function as the slot machine's arm. If prompted to reset the arm, push the joystick all the way up. Then give it a pull. Once the joystick is pulled all the way down, the machine will engage. If you want sound in the game, add :SOUND100,1 to the end of Line 8, and change the end of Line 23 to read ML=ML+1:SOUND1,1:NEXT. That's about it. It's rather short, but I wrote it to stay within the constraints of a 4K computer. Feel free to dress it up in any way you see fit. Chances are you have more than enough memory to add quite a few features.

The listing: SLOTS

```
1 CLS:CLEAR270:ML=25:PRINT@41,"O
NE ARM BANDIT":PRINT@360,"BY KE
N CARLIN":A$=" ":B$=" ":C$="
":D$=CHR$(142):E$=CHR$(139)
2 FORA=1TO5:D$=D$+CHR$(131):E$=E
$+CHR$(140):NEXT:D$=D$+CHR$(141)
:E$=E$+CHR$(135):F$=CHR$(133)+C$
+CHR$(138):G$=A$+D$+B$+D$+B$+D$:
H$=A$+F$+B$+F$+B$+F$:I$=A$+E$+B$
+E$+B$+E$:J$=G$+B$+H$+B$+I$:DIMK
$(8):D=159:FORC=1TO7:FORE=1TO2
3 K$(C)=K$(C)+CHR$(D)+" ":NEXTE:
K$(C)=K$(C)+CHR$(D):D=D+16:NEXTC
:K$(8)="*****":GOSUB32:CLS:DIMG(
3):PRINT@192,J$:GOTO24
4 H(1)=RND(RND(7)):H(2)=RND(RND(
7)):H(3)=RND(7)+1
5 FORK=1TO3:FORE=1TO50:ON K GOTO
6, 7, 8
6 PRINT@227,K$(RND(7));
7 PRINT@237,K$(RND(7));
8 PRINT@247,K$(RND(7)+1);
9 NEXTE:PRINT@227+((K-1)*10),K$(
H(K));
12 NEXTK:FORT=1TO500:NEXT:C1=POI
NT(6,14):C2=POINT(26,14):C3=POIN
T(46,14)
13 IF((C1=C2)AND(C2=C3))OR((C1=C
2)AND(C3=-1))THEN14ELSEIF(C1=C2)
ANDC1=2THEN14ELSEIFC1=2THENMO=BE
```

```
*2:PA$=" 2 TO 1":GOTO23ELSE24
14 C1=C1-1
15 ON C1 GOTO 16, 17, 18, 19, 20
, 21, 22
16 MO = BE*5:PA$=" 5 TO 1":GOTO2
3
17 MO = BE*10:PA$="10 TO 1":GOTO
23
18 MO = BE*20:PA$="20 TO 1":GOTO
23
19 MO = BE*35:PA$="35 TO 1":GOTO
23
20 MO = BE*50:PA$="50 TO 1":GOTO
23
21 MO = BE*100:PA$="100 TO 1":GO
TO23
22 MO = BE*200:PA$="200 TO 1"
23 PRINT@332,"WINNER !":PRINT@13
5,"PAYOFF IS "PA$:FORX=1TOMO:PRI
NT@56,ML;:ML=ML+1:NEXT
24 IFML=0THEN30ELSEPRINT@45,"MON
EY LEFT:"ML;:PRINT@79,"THIS BET:
?":PRINT@389,"PLACE YOUR BET (
1-5)":Y$=INKEY$
25 BE$=INKEY$:Z=RND(99999):IFBE$
=""THEN25ELSEPRINT@320,"":PRINT@
135,"":BE=VAL(BE$):IFBE<1ORBE>5T
HEN25
26 IFML-BE<0THENPRINT@448,"*YOU
DO NOT HAVE THAT MUCH LEFT*":FO
RT=1TO1800:NEXT:PRINT@448,"":GOT
O25
27 PRINT@88,BE:ML=ML-BE:PRINT@56
,ML:PRINT@389,""
28 '
29 PRINT@390,"":GOTO4
30 CLS
31 PRINT@198,"YOU ARE OUT OF MON
EY":PRINT@294,"CARE TO PLAY AGAI
N ?":PRINT@334,"(Y/N)":P$=INKEY$
:IFP$=""THEN31ELSEIFP$="Y"THEN1E
LSECLEAR200:END
32 PRINT@192,J$:PRINT@227,K$(RND
(7));:PRINT@237,K$(RND(7));:PRIN
T@247,K$(RND(8));:PRINT@455,"PRE
SS <P> TO PLAY":Z=RND(9999):W$=I
NKEY$:IFW$<>"P"THEN32ELSERETURN
```

Submissions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one sitting and are useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.

Program submissions must be on tape or disk. We're sorry, but we cannot key in program listings. All programs should be supported by some editorial commentary, explaining how the program works. If your submission is accepted for publication, the payment rate will be established and agreed upon prior to publication.



If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. Remember, keep your ideas specific, and don't forget this is BASIC. All programs resulting from your wishes are for your use, but remain the property of the author.

A continuation of last month's "opposites" game, for more advanced students

Two for the Price of One

By Fred B. Scerbo
Rainbow Contributing Editor

Over the last two months I've introduced two brand-new programs, *Opposite Concepts I* and *Match Game of Opposites I*. These programs were designed to train the young user in telling the difference between opposite concepts by employing a set of 20 pairs of examples (i.e., hot versus cold). *Match Game* took these concepts one step further and made recall of the terms a great deal of fun. (You could even have adults play this variation of *Concentration* just for fun, since both young and old would have the same chances of winning. Remember, you can't put a price tag on quality time you spend with your kids — this is just another tool for that goal.)

This month, I'm offering you a set of 20 additional opposite concepts. These concepts will be a little more abstract, with terms like "in front of" and "behind" or "talk" and "listen." Those of you who want details on how these programs work should refer to the last two months' articles, rather than having all the technical lingo repeated here.

How these 20 came into being is almost an adventure in itself. After I had struggled to come up with the first set, one of the elementary teachers who has since started using these programs commented that she would hardly be able to come up with 20 sets of opposites to begin with. When I remarked to her that I had already developed a second set of 20, with the graphics to go along with it, she was quite surprised. She then dared me to come up with a third set of 20. (Believe it or not, after sitting down with a few of my own upper-level

students for a half hour, we actually were able to come up with 20 more, as well as the graphics to go along with them. I'll save those for several months, though, to see what your reaction is to these first installments. We don't want to overdo a good thing.)

Too Much Typing!

If you have typed in the last two months' programs, I am going to give you a few pointers on how to save some time in getting both new programs quickly into your CoCo. Remember, the easiest way to get these programs error-free is by subscribing to either RAINBOW ON TAPE or RAINBOW ON DISK. If you don't have a subscription, I'll now mention two quick ways to save some hacking time.

Tape Only?

Those of you without a disk drive will not be able to use the MERGE command found in Extended Disk BASIC. In that case, if you want to type in the listing shown here, you should load your error-free copy of *Opposite Concepts I* from two months ago. Next, follow the steps shown below.

1. With the program loaded, type OEL 395-790 and press ENTER.
2. Retype lines 2, 85, 90 and 95 from this month's new listing.

3. Type in lines 395 through 790 from the new listing.
4. Save your new listing to tape with a different filename, such as OPO-SITE2.

Now you may take some steps to use this data in *Match Game of Opposites*, following these steps:

1. Reload OPOSITE2.
2. Type OEL 0-390 and press ENTER.
3. Type OEL 795- and press ENTER.
4. Delete lines:

400	500	600	700
410	510	610	710
420	520	620	720
430	530	630	730
440	540	640	740
450	550	650	750
460	560	660	760
470	570	670	770
480	580	680	780
490	590	690	790

We do not need these DATA lines in *Match Game of Opposites*. Simply type the line number and press ENTER.

5. Type RENUM 110,395,0 and press ENTER.
6. From last month's listing type in lines 1 through 105 and 310 through 620. Also, retype Line 2 to read 2 REM*MATCH GAME OF OPOSITES 2*.
7. Save the entire program and test it for errors. You may want to use a different filename, such as MATCH2.

You will now have copies of both programs with all the new data in place. If you find this too confusing, simply type in the listing as you see it here.

Disk Users Only!

Disk users have a much easier time with this, since you can use the MERGE command. To get OPOSITE2, follow the same instructions as you would above for tape. What you are actually doing is deleting the old DATA lines from OPOSITE1 and typing in the new lines 395 through 790. Also be sure to retype lines 2, 85, 90 and 95.

However, for the next program you can save a great deal of time by using the MERGE command. To do this, after you have saved OPOSITE2 to disk,

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follow steps 1 through 5 above for *Match Game of Opposites*. From that point on, do the following:

6. On a new formatted disk, save this new DATA list by typing SAVE"VOL2".A and press ENTER. This saves the lines to your disk in ASCII.
7. Load your copy of *Match Game of Opposites* from last month's issue. Next, place the new disk with VOL2 on it in your drive, type MERGE "VOL2" and press ENTER. The new

- lines will now take the place of all the old data, and the program should be ready to run, provided you have not made any typing errors. Also, retype Line 2 as 2 REM *Match Game of Opposites*.
8. Save this new version with the filename MATCH2 or some other appropriate name. You don't want to use the same filename as VOL1, since you would be killing the old file and writing over it with your new program.
- Both programs are now ready to run.

Refer to the last two months' issues for instructions on how to run the programs. Only the material covered will be different.

Next month will be the final chapter in this series of early childhood education programs. I'll list a third, totally different program, which will introduce this material inserted into sentences while still using our graphics. Let me know if these programs prove as valuable to you as you they have to our elementary students! □

Editor's Note: For your convenience, both programs (OPOSITE2 and MATCH2) will appear on this month's issue of RAINBOW ON TAPE and RAINBOW ON DISK. This will ensure that those of you who want bug-free copies will not have to merge for MATCH2.

✓ 50	.....170	565	.....95
95	.....127	605	.....108
165	.....71	635	.....94
260	.....237	675	.....235
340	.....174	705	.....151
400	.....194	750	.....192
440	.....93	785	.....187
475	.....241	910	.....32
525	.....4	END	.....113

The listing: OPOSITE2

```

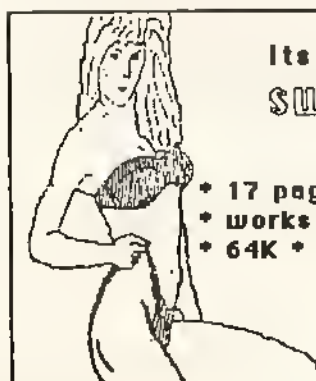
1 REM*****
2 REM* OPPOSITE CONCEPTS VOL.2 *
3 REM* COPYRIGHT (C) 1988 *
4 REM* BY FRED B. SCERBO *
5 REM* 60 HARDING AVENUE *
6 REM* NORTH ADAMS, MA 01247 *
7 REM*****
10 CLEAR3000
15 CLS0:PRINTSTRING$(32,188);STR
ING$(32,156);:FORI=1TO 256 :READ
A:PRINTCHR$(A+128);:NEXT
20 PRINTSTRING$(32,195);STRING$(
32,179);
25 PRINT@422," BY FRED B.SCERBO
";:PRINT@454," COPYRIGHT (C) 1
988 ";
30 DATA126,124,124,125,117,124,1
24,122,126,124,125,117,124,124,1
25,117,124,124,124,116,126,117,1
24,126,125,117,124,124,117,124,1
24,124
35 DATA122,,,117,117,115,115,122
,123,115,119,117,,,117,117,115,1
15,115,,122,,,122,,117,115,114,1
17,115,115,115

```

```

40 DATA122,,,117,117,,,122,,,11
7,,,117,,,117,122,,,122,,117,,
,,,117
45 DATA124,124,124,124,116,,,32,
120,,,116,124,124,124,116,124,12
4,124,116,124,,116,124,,116,124,
124,116,124,124,124
50 DATA46,44,44,45,37,,,32,42,,,
37,44,44,45,36,44,44,45,36,46,,3
6,46,32,37,44,44,36,44,44,45
55 DATA42,,,37,37,35,35,34,43,35
,35,37,,,37,33,35,35,39,,42,,,42
,,37,35,34,33,35,35,39
60 DATA42,,,37,37,,,42,42,,37,37
,,,37,37,32,,,42,33,32,42,33,37
,,,37,,,
65 DATA44,44,44,44,36,44,44,40,4
4,44,44,36,44,44,44,36,44,44,44,
36,44,36,44,44,44,36,44,44,36,44
,44,44
70 X$=INKEY$:IFX$<>CHR$(13) THEN7
0
75 DIM P$(20,2),A$(6),B$(20),C$(
20),A(20),N(20),B(4),C(4),D(4),E
(4),F(4),AO(20)
80 FORI=1TO3:READ C(I),D(I),E(I)
,F(I):NEXT:FORI=1TO6:READA$(I):N
EXT:FORI=1TO20:READP$(I,1),B$(I)
,P$(I,2),C$(I):NEXT
85 COLOR1,0
90 REM TITLE
95 CLS:PRINTSTRING$(32,"=");:PRI
NT@68,"OPPOSITE CONCEPTS VOL.2":

```



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```

PRINT@134,"A) REVIEW ALL TERMS":
PRINT@198,"B) QUIZ GRAPHICS":PRI
NTE262,"C) QUIZ TERMS ONLY"
100 PRINT@324,"<<<SELECT YOUR CH
OICE>>>"
105 PRINT:PRINTSTRING$(32,"=");:
PRINT@420,"DEDICATED TO THE STUD
ENTS":PRINTTAB(8)"OF JOHNSON SCH
OOL"
110 X$=INKEY$:X=RND(-TIMER):IFX$
="A"THEN365ELSEIFX$="B"THEN115EL
SEIFX$="C"THEN795ELSE110
115 CLS:PMD0,1:PCLS1
120 LINE(0,0)-(254,170),PRESET,B
125 LINE(6,4)-(122,82),PRESET,BF
130 LINE(128,4)-(248,82),PRESET,
B
135 LINE(6,86)-(122,164),PRESET,
B
140 LINE(128,86)-(248,164),PRESE
T,B
145 DRAW"BM26,188C0NU10R10NU10BR
6R10U6L10U4R10BR6NR10D4NR10D6R10
BR12BU6NE4D2F4BR6R10U6L10U4R10BR
6ND10R10D4NL10BR6NR10D6U10R10D10
BR6NR10U10R10BR6NR10D4NR10D6R10B
R10U10NL4R10D4NL10D6NL14BR6U10R1
0D4NL10D6BR6U10R10D4L10R4F6BR6E4
U2H4"
150 DATA130,6,246,80,6,86,120,16
2,130,86,246,162
155 PAINT(2,2),0,0:PCOPY1TO3
160 PMD0,4:PCLS1
165 LINE(0,0)-(254,170),PRESET,B
F
170 LINE(8,6)-(120,80),PSET,BF
175 PCOPY4TO2:PMD0,1:SCREEN1,1
180 DATA"BM2,8C1","BM130,8C0","B
M2,90C0","BM130,90C0","BM2,48C0"
,"BM130,48C0"
185 FORI=1TO20
190 A(I)=RND(20):IFN(A(I))=1THEN
190
195 N(A(I))=1:NEXTI:FORI=1TO20:C
OLOR1,0
200 FORI=2TO4
205 B(I)=RND(3)+1:IFN(B(I))=0THE
N205
210 N(B(I))=0:NEXTI:FORI=1TO4:N(
I)=1:NEXT
215 B=RND(20):IFB=A((Y))THEN215
220 C=RND(20):IFC=B OR C=A((Y))T
HEN220
225 DRAW A$(1):DRAWP$(A(Y),1)
230 DRAW A$(B(2)):DRAWP$(B,2)
235 DRAW A$(B(3)):DRAWP$(C,2)
240 DRAW A$(B(4)):DRAWP$(A(Y),2)
245 COLOR1,0
250 Z=0
255 PMD0,4
260 DRAW A$(1)+"C0":DRAWP$(A(Y),

```

```

1)
265 DRAW A$(B(2))+ "C1":DRAWP$(B,
2)
270 DRAW A$(B(3))+ "C1":DRAWP$(C,
2)
275 DRAW A$(B(4))+ "C1":DRAWP$(A(
Y),2)
280 PMD0,1:SCREEN1,1
285 LINE(8,6)-(120,80),PSET,B
290 X$=INKEY$:IFX$=" "THEN300ELS
EIFX$="@ "THEN965
295 COLOR1,0:LINE(8,6)-(120,80),
PRESET,B:GOTO285
300 Z=Z+1:IFZ=4THENZ=1
305 COLOR1,0:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PSET,B
310 X$=INKEY$:IFX$=" "THEN300ELS
EIFX$=CHR$(13)THEN320ELSEIFX$="@
"THEN965
315 COLOR1,0:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PRESET,B:GOTO305
320 IFZ+1=B(4)THEN330
325 NW=NW+1:FORK=1TO5:PMD0,4:S
CREEN1,1:SOUND1,3:PMD0,1:SCRE
EN1,1:SOUND1,3:NEXTK:GOTO305
330 NC=NC+1:PMD0,4:PCLS1:LINE(
0,40)-(256,126),PRESET,B:LINE(6,
44)-(124,122),PRESET,B:LINE(130,
44)-(248,122),PRESET,B:PAINT(2,4
2),0,0
335 DRAW A$(5):DRAWP$(A(Y),1)
340 DRAW A$(6):DRAWP$(A(Y),2)
345 SCREEN1,1
350 X$=INKEY$:IFX$<>CHR$(13)THEN
350
355 PMD0,1
360 PCOPY3TO1:SCREEN1,1:PCOPY2TO
4:NEXTY:GOTO965
365 PMD0,2:PCLS1:SCREEN1,1:LIN
E(0,40)-(256,126),PRESET,B:LINE(
6,44)-(124,122),PRESET,B:LINE(13
0,44)-(248,122),PRESET,B:PAINT(2
,42),0,0
370 FORI=1TO20:DRAW A$(5):DRAWP$
(I,1)
375 DRAW A$(6):DRAWP$(I,2)
380 X$=INKEY$:IFX$<>CHR$(13)THEN
380
385 COLOR1,0:LINE(8,46)-(122,120
),PSET,BF:LINE(132,46)-(246,120)
,PSET,BF:NEXTI
390 RUN
395 DATA"BR24BD10R20F10L20NH10R6
0M+20,+8BL20NL60BR20M-20,+8L60G1
0R20E10L20U16BL8NL16BD4NL16BD4NL
16BD4NL16BD4NL16BD32BR10U6NR10U4
R10BR6ND10R10D4NL10D6BR6R10U6L10
U4R10BR6R6ND10R6"
400 DATA FAST
405 DATA"BR42BD44NR30H10U10E10R2
0F8D10G4L16H6U4E4R8F4D2G2L4H2BD8

```

R16E6R6NE6F4D4NL4G4L6BU8BR4RBD34
BL46R1ØU6L1ØU4R1ØBR6D1ØR6BR6U1ØR
1ØD1ØNL1ØBR6NU1ØR6NU8R6U1Ø"
41Ø DATA SLOW
415 DATA"BR32BD4R6ØD46L6ØU46BF2R
1ØNF4R18ND6R18NG4R1ØD5NG4D16NL6D
16NH4D5L1ØNH4L18NU6L18NE4L1ØU5NE
4U16NR6U16NF4U5BD23BR28F8U2H8NU2
M-18, -4BD46BL26NU1ØR1ØU6NL1ØU4NL
1ØBR6NR1ØD4NR1ØD6R1ØBR6U6NR1ØU4R
1ØBR6ND1ØR1ØD1ØNL1ØBR6U1ØR1ØD4L1
ØR4F6BR6NR1ØU6NR1ØU4R1Ø"
42Ø DATA BEFORE
425 DATA"BR32BD4R6ØD46L6ØU46BF2R
1ØNF4R18ND6R18NG4R1ØD5NG4D16NL6D
16NH4D5L1ØNH4L18NU6L18NE4L1ØU5NE
4U16NR6U16NF4U5BD23BR28F8U2H8NU2
M+18, -4BD46BL56U1ØR1ØD4NL1ØD6BR6
U6NR1ØU4R1ØBR6R6ND1ØR6BR6NR1ØD4N
R1ØD6R1ØBR6U1ØR1ØD4L1ØR4F6"
43Ø DATA AFTER
435 DATABF3ØE8R2E2NH6R2E2R4E2NH6
R6E2R6NH6R4F2R6F2R4NH8F2R2F2R2F8
H2L2G2L2G2L4G2L6G2L2ØH2L6H2L4H2L
2H2NL2F2R2F2R4F2R6H4U2H2U4E2BR3Ø
F2D4G2D2G4BU4BL1ØU8F2D4L4U6D8H2U
4BG36BD8U1ØR1ØD4NL1ØD6BR6NU1ØR6N
U8R6NU1ØBR6U1ØR1ØD4NL1ØD6BR6U1ØD
4NE4F6BR6NR1ØU6NR1ØU4R1Ø
44Ø DATA AWAKE
445 DATA"BF24BR4F2R2F2NG6R2F2R6F
2NG6F2R8NG6R8E2R6NG8E2R4E2R2E2R2
NG1ØE2BU2ØBL7ØR1ØG1ØR1ØBR6RBR6RB
R6NR1ØE1ØNL1ØBD1ØBR6RBR6RBR6NR1Ø
E1ØNL1ØBD1ØBR6RBR6RBL86BD54U1ØR1
ØD4NL1ØD6BR6R1ØU6L1ØU4R1ØBR6D1ØR
8BR6NR1ØU6NR1ØU4R1ØBR6NR1ØD4NR1Ø
D6R1ØBR6U1ØR1ØD4L1Ø"
45Ø DATA ASLEEP
455 DATA"BD6BF38R8E4U1ØR4U6L4U6H
4L16G4D6L4D6R4D1ØF4R8BU6NE4NH4BU
8NLNR2BU6BL4NR2BR6R2BR4ØBD2ØR8E4
U1ØR4U6L4U6H4L16G4D6L4D6R4D1ØF4R
8BU6NE4NH4BU8NLNR2BU6BL4NR2BR6R2
BL54BD44NU1ØR6NU8R6NU1ØBR6U1ØBR6
R6ND1ØR6BR6D1ØU6R1ØU4D1Ø"
46Ø DATA WITH
465 DATA"BR6ØBD44R8E4U1ØR4U6L4U6
H4L16G4D6L4D6R4D1ØF4R8BU6NE4NH4B
U8NLNR2BU6BL4NR2BR6R2BL52BD44NU1
ØR6NU8R6NU1ØBR6U1ØBR6R6ND1ØR6BR6
D1ØU6R1ØU4D1ØBR6U1ØR1ØD1ØNL1ØBR6
NU1ØR1ØU1ØBR6R4ND1ØR4"
47Ø DATA WITHOUT
475 DATA"BR6ØBD5ØR8E4U1ØR4U6L4U6
H4L16G4D6L4D6R4D1ØF4R8BU6NE4NH4B
U8NLNR2BU6BL4NR2BR6R2BU12NL12R4U
2NL16U2NL3ØR14L2D8NF2NG2BD46BL44
NU1ØR6NU8R6NU1ØBR6NU1ØBR6R1ØU6L1
ØU4R1ØBR6NR1ØD4NR1ØD6R1Ø"
48Ø DATA WISE

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APR '84 Gaming \$3.95 <input type="checkbox"/>		APR '87 Home Help \$3.95 <input type="checkbox"/>	
MAY '84 Printer \$3.95 <input type="checkbox"/>		MAY '87 Printer \$3.95 <input type="checkbox"/>	
JUN '84 Music \$3.95 <input type="checkbox"/>		JUN '87 Music \$3.95 <input type="checkbox"/>	
JUL '84 Anniversary \$3.95 <input type="checkbox"/>		JUL '87 Anniversary \$3.95 <input type="checkbox"/>	
VOLUME 4		VOLUME 7	
AUG '84 Games \$3.95 <input type="checkbox"/>		AUG '87 Games \$3.95 <input type="checkbox"/>	
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DEC '84 Holiday \$3.95 <input type="checkbox"/>		DEC '87 Holiday \$3.95 <input type="checkbox"/>	
JAN '85 Beginners \$3.95 <input type="checkbox"/>		JAN '88 Beginners \$3.95 <input type="checkbox"/>	
FEB '85 Utilities \$3.95 <input type="checkbox"/>		FEB '88 Utilities \$3.95 <input type="checkbox"/>	
MAR '85 Business \$3.95 <input type="checkbox"/>		MAR '88 Business \$3.95 <input type="checkbox"/>	
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MAY '85 Printer \$3.95 <input type="checkbox"/>		MAY '88 Printer \$3.95 <input type="checkbox"/>	
JUN '85 Music \$3.95 <input type="checkbox"/>		JUN '88 Music \$3.95 <input type="checkbox"/>	
JUL '85 Anniversary \$3.95 <input type="checkbox"/>		JUL '88 Anniversary \$3.95 <input type="checkbox"/>	
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		AUG '88 Games \$3.95 <input type="checkbox"/>	
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485 DATA"BR60BD50R8E4U10R4U6L4U6
H4L16G4D6L4D6R4D10F4R8BU10NG4NF4
BU4NLNR2BU6BL4NR2BR6R2BU10R6M-10
,-20M-10,+20BD48BL36U6NR10U4R10B
R6ND10R10D10NL10BR6U10R10D10NL10
BR6NU10R8BR6NU10BR6R10U6L10U4R10
BR6D10U6R10U4D10"
490 DATA FOOLISH
495 DATA"BRBD26BR24R76M-30,-10L4
G4L4H4L4M-30,+10D2M+30,+6R4E2R8F
2R4M+30,-6BD40BL80U10R10D4NL10BR
6D6U10R10D4L10R4F6BR6NR10U6NR10U
4R10BR6R4ND10R4BR6R4ND10R4BR6F4N
E4D6"
500 DATA PRETTY
505 DATA"BD22BR20NE4NG4R76NH4NF4
G12L52H12F6R10NU6ND6R10NU6ND6R2N
U6R2NU6R2NU6R2NU6ND6R10NU6ND6R2N
D6R2ND6R2ND6R2ND6NU6R10NU6ND6R6B
D40BL56NU10R10NU10BR6NR10U10R10B
D4NL4D6BR6NU10R8BR10U6NE4NH4"
510 DATA UGLY
515 DATA"BR16BD20R80M-4,+20L36M-
4,-18NL36E4R36H2L32R12U4R8D4BD42
BL56NR8D10R8BR6U10R8D10NL8BR12M-
6,-10BR12M-6,+10BR12NR8U6NR8U4R8
BR6ND10R10D4L10R4F6"
520 DATA COVER
525 DATA"BR16BD20R80M-4,+20L36M-
4,-18NL36BU8BE4R36H2L32R12U4R8D4
BD60BL70NU10R10NU10BR6U10F10U10B
R6NR8D10R8BR6U10R8D10NL8BR12M-6,
-10BR12M-6,+10BR12NR8U6NR8U4R8BR
6ND10R10D4L10R4F6"
530 DATA UNCOVER
535 DATA"BD2BR56F12D4G2L4D2F2D2M
-16,+4M+12,+3F2D2G4D4G2L14G2D4BE
20BR12NR26BD4M+20,+6BU20M-20,+6B
H18L4F2BD46BL22R6ND10R6BR6ND10R1
0D4NL10D6BR6NU10R8BR6U10D4R4NE4F
6"
540 DATA TALK
545 DATABD18BR94U4H4L4NU8L8G4D2G
2D12F2DF8R4ND6R6E4BH6L4H2U4BL28B
D20E2R2E2U4E2U20H2U4H2L2H2BL12BD
34E2R2E2U4E2U10H2U4H2L2H2BL12BD2
8E2R2E2U4E2U4H2U4H2L2H2BL12BD4NF
6D14L6F2L2BD26BR4D10R8BR6NU10BR8
R10U6L10U4R10BR6R6ND10R6BR6NR10D
4NR10D6R10BR6U10F10U10
550 DATA LISTEN
555 DATA"BR30BD8NE4NU8NH4BL8D10N
R60D20NR60D10R60BR6F4H2G2E4BR6U2
0NL60U20L60BD60BL14R10U6L10U4R10
BR6R6ND10R6BR6ND10R10D4NL10D6BR6
U10R10D4L10R4F6BR12U10L6R12"
560 DATA START
565 DATA"BR20BD8D10NR60D20NR60D1
0R60BR6F4H2G2E4BR6U20NL60U20NL60
D40BR6NE4NR8NF4BD20BL82U6NR10U4R
10BR8D10BR8U10F10U10BR8D10BR8R10

U6L1ØU4R1ØBR6D1ØU6R1ØU4D1Ø"
 57Ø DATA FINISH
 575 DATA"BR44BD4R6F4R2E4R2F4R2E4
 R6G8L2ØNH8D4R2ØNU4F12D14G6L3ØH6U
 14E12BF6BD4NR8L4D6R12D6L12R6ND4N
 U16BD3ØBL26U1ØR1ØD4L1ØR4F6BR8NU1
 ØBR8NR1ØU1ØR1ØBR6D1ØU6R1ØU4D1Ø"
 58Ø DATA RICH
 585 DATA"BR58BD6R6F2R2F2R2F4R2F4
 D4F2D6G2D4G4L2G4L2G2L2G2L12H2L2H
 2L2H4L2H4U4H2U6E2U4E4R2E4R2E2R2E
 2R4BD12BL2NG4D16L4R8BR8BU4U4R2L6
 U4R6L2U4BD5ØBL36U1ØR1ØD4NL1ØBR6D
 6U1ØR1ØD1ØNL1ØBR6U1ØR1ØD1ØNL1ØBR
 6U1ØR1ØD4L1ØR4F6"
 59Ø DATA POOR
 595 DATA"BR36BD2ØR5ØD3ØL5ØU3ØBF6
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 BR4ND16BR4D16BD4NL24BR8BU4R4U2L4
 U2R4BU6L4U2R4U2L4BR32BU18M-14,+6
 BL12NE8BL1ØNE8BL1ØNU8BL1ØNH8BL12
 NH8BL12M-14,-6BD58BR14U1ØF1ØU1ØB
 R6ND1ØR1ØD1ØNL1ØBR8NU1ØBR8R1ØU6L
 1ØU4R1ØBR6F4NE4D6"
 6ØØ DATA NOISY
 6Ø5 DATA"BD2BR36F12D4G2L4D2F2D2G
 4NL1ØF2D2G4D4G2L14G2D4BR28U24E4R
 2F4D1ØE2R2F2E2R2F2E2R2F2D1ØG4BU2
 ØBL8R6U4L6U4R6BR6D8U4R8U4D8BR6U8
 D4R8U4D8BR4R2BR4R2BL84BD38U1ØR1Ø
 D1ØNL1ØNF2NH4BR6NU1ØR1ØNU1ØBR8NU
 1ØBR8NR1ØU6NR1ØU4R1ØBR6R6ND1ØR6B
 L64BU48L6"
 61Ø DATA QUIET
 615 DATA"BR4ØBD2R44F4D2M-8,+2ØG8
 L4D4F4NL2ØD6L2ØU6E4U4L4H8M-8,-2Ø
 U2E4BD4BR2G2M+6,+16R2U18NL4BR28D
 18R2M+6,-16H2L4BL22BD4NG2D16NL2R
 2BR2BU6R4U4L4U4R4BR4R2ND8R2BD56B
 L32NU1ØR8NU8R8NU1ØBR8NU1ØBR8U1ØF
 1ØU1Ø"
 62Ø DATA WIN
 625 DATA"BR34BD16R6U4L6U4R6BR4NR
 6D8R6BR4U8R6D8NL6BR4U8R6D4L6R2F4
 BR4NR6U4NR6U4R6BD2ØBL5ØD1ØR1ØU1Ø
 NL1ØBR6BD4R6BR1ØBD6R4NR4U1ØNG4BR
 1ØD1ØR1ØU1ØL1ØBF18L74U44R74D44BD
 22BL64NU1ØR8BR6U1ØR1ØD1ØNL1ØBR6R
 1ØU6L1ØU4R1ØBR6NR1ØD4NR1ØD6R1Ø"
 63Ø DATA LOSE
 635 DATA"BR62BD36R8E4U1ØR4U6L4U6
 H4L16G4D6L4D6R4D1ØF4R8BU1ØNG4NF4
 BU4NLNR2BU6BL4NR2BR6R2BD1ØBF8M-1
 2,+18M-12,-18BU24BR38D3ØR4U3ØL4U
 6R12D2R8F6D4L4H4L6U2L1ØBL5ØBD8L2
 2D2NR22R2D4F6G6D4L2NR22D2R22U2L2
 U4H6E6U4BD48U1ØR1ØD1ØNL1ØBR6NU1Ø
 R8BR6R2NR1ØU1ØL2R12D1Ø"
 64Ø DATA OLD
 645 DATA"BR6ØBD44R8E4U8R4U6L4U6H

4L16G4D6L4D6R4D8F4R8BU6NE4NH4BU8
 NLNR2BU6BL4NR2BR6R2BU8U2H2L4BR26
 BD6R1ØD2ØL1ØU2ØE2R6L2U2L2BL58BD4
 L2G2D4F2R2D1ØG2D2F2E2U2H2U1ØR2E2
 U4H2L2BD4ØBL6F4ND6E4BR6D1ØR1ØU1Ø
 NL1ØBR6D1ØR1ØNU1ØBR6U1ØF1ØNU1ØBR
 6NR1ØU1ØR1ØBD4NL4D6"
 65Ø DATA YOUNG
 655 DATA"BR18BD4R6ØD46L6ØU46BF2R
 1ØNF4R18ND4R18NG4R1ØD5NG4D16NL6D
 16NH4D5L1ØNH4L18NU6L18NE4L1ØU5NE
 4U16NR6U16NF4U5BD23BR28F8U2H8NU2
 U12BR4ØND8R12D4NL12D4BD8ND8G6H6D
 8BD28BL6ØNR8U6NR8U4R8BR6ND1ØR1ØD
 4NL1ØD6BR6U1ØR8D4L8R2F6BR6NU1ØR8
 BR1ØU6NE4NH4"
 66Ø DATA EARLY
 665 DATA"BR18BD4R6ØD46L6ØU46BF2R
 1ØNF4R18ND4R18NG4R1ØD5NG4D16NL6D
 16NH4D5L1ØNH4L18NU6L18NE4L1ØU5NE
 4U16NR6U16NF4U5BD23BR28H8U2F8NU2
 U12BR4ØND8R12D4NL12BD4BD8ND8G6H6
 D8BD28BL56NU1ØR8BR6U1ØR1ØD4NL1ØD
 6BR12U1ØL6R12BR6NR1ØD4NR1ØD6R1Ø"
 67Ø DATA LATE
 675 DATABR12BD4ØR1ØØL14BU2E2NR6U
 2H2L2G2D2NF2L14NG2U2H2L2G2D2NF2L
 1ØU4R4U2E6R2ØF4R1ØD8NR2BL54L4NG2
 U2H2L2G2D2NF2L14NG2U2H2L2G2D2NF2
 L1ØU2ØR28D6R6D6R8ND8BE22D8NE4NH4
 BL6ØBD42D1ØBR6U1ØF1ØNU1ØBR12U6NR
 8U4R8BR6ND1ØR8D4L6F6BR6U1ØR8D1ØN
 L8BR6U1ØF1ØU1ØBR6R8L4D1Ø
 68Ø DATA IN FRONT OF
 685 DATABR12BD4ØR98L8BU4NG2U2H2L
 2G2D2NF2L14NG2U2H2L2G2D2NF2L1ØU2
 ØR28D6R6D6R8D8L4BL56BD2E2NR6U2H2
 L2G2D2NF2L14NG2U2H2L2G2D2NF2L1ØU
 4R4U2E6R2ØF4R1ØD8NR2BH22NU8NH4NE
 4BD52BL14NU1ØR8U6NL8U4NL8BR6NR8D
 4NR8D6R8BR6U1ØD4R8U4D1ØBR8U1ØBR8
 ND1ØF1ØU1ØBR6R8D1ØL8R2U8
 69Ø DATA BEHIND
 695 DATA"BR12BD4ØR1ØØL64BU2E2NR6
 U2H2L2G2D2NF2L14NG2U2H2L2G2D2NF2
 L1ØU4R4U2E6R2ØF4R1ØD8R2BD4R8U24N
 G4U4NR44L8E12NR4ØBG16BL12NL14NH4
 NG4BD42BL2ØNR1ØD4NR1ØD6R1ØBR6U1Ø
 F1ØU1ØBR6R6ND1ØR6BR6NR1ØD4NR1ØD6
 R1ØBR6U1ØR1ØD4L1ØR4F6"
 7ØØ DATA ENTER
 7Ø5 DATA"BR12BD4ØR1ØØL14BU2E2NR6
 U2H2L2G2D2NF2L14NG2U2H2L2G2D2NF2
 L1ØU4R4U2E6R2ØF4R1ØD8NR2BD4L52U2
 4NF4U4NL44R8H12NL4ØBF16BR12R14NH
 4NG4BD42BL6ØNR1ØD4NR1ØD6R1ØBR6E6
 NH4NE4F6BR8U1ØBR8R6ND1ØR6"
 71Ø DATA EXIT
 715 DATA"BR3ØBD24ND1ØF1ØM+28,-8R
 1ØF1ØG4NL1ØG6L1ØM-28,-8G1ØU1ØU2B


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R36NH4NG4BR10BU4R2BR12R2BU6R2BU6
R2BU6R2BU10BR4NF4G4L8H4G4L8H4G4L
8H4G4L8H4G4L8H4G4BD60BR10U10R10D
4NL10D6BR6NU10R8BR8U10BR6D4F6E6U
4BR6NR10D4NR10D6R10"
720 DATA ALIVE
725 DATA"BR30BD24ND20F10NG10R6NU
4ND4R6NU6ND6R6NU8ND8R6NU8ND8R6NU
8ND8R6ND8U8R4F8G4NL4G4L4BD26BL46
NL2U10L2R12D10NL10BR6NR10U6NR10U
4R10BR6ND10R10D4NL10D6BR6R2NU10R
10U10L12BU38BL10E2U2H2U2E2U2H2U2
BL12D2F2D2G2D2F2D2G2"
730 DATA DEAD
735 DATA"BR34BD34NU8R6NU8R6NU8BR
6U8R8D4NL8D4BR6NU8R8BR6U8D4R4NE4
F4BR6ND4U12L68D16NR68U18R68U2L68
U2R68U2L68U2R68U2L68U2R68U2L68L
28NU6L10NU6BD32ND6BR10ND6BD20BL1
8ND10R10BD4NL4D6NL10BR6U10R10D10
L10"
740 DATA GO
745 DATA"BR34BD34NU8R6NU8R6NU8BR
6U8R8D4NL8D4BR6NU8R8BR6U8D4R4NE4
F4BR6ND4U12L68D16NR68U32R68ND32L
28NU6L10NU6BD32ND6BR10ND6BU20BL3
4R2NU8R8U8NL10BR6ND8R8D8NL8BR6U8
F8U8BR6R2ND2BR4R4ND8R4BD58BL60R1
0U6L10U4R10BR6R6ND10R6BR6ND10R10
D10NL10BR6U10R10D4L10"
750 DATA STOP
755 DATA"BR22BD16NR68M+4,+10F16G
6R40H6E16M+4,-10BD10BR6R10F4D6G1
0M-10,+3L10E6R10E6U2H2L4U4BU10BL
30G6D4NF4G8BD32BL36R2NU10R10U6NL
10U4NL12BR6ND10R10D4L10R4F6BR6U1
0R10D10NL10BR6NU10U6R4NE4F6BR6NR
10U6NR10U4R10BR6ND10F10U10"
760 DATA BROKEN
765 DATA"BR22BD16NR68M+4,+10F16G
6R40H6E16M+4,-10R10F4D6G10M-10,+
3L10E6R10E6U2H2L4BD46BL66U6NR10U
4R10BR8D10BR8E6NH4NE4F6BR6NR10U6
NR10U4R10BR6R2ND10R10D10NL12"
770 DATA FIXED
775 DATA"BR30BD42R50E4U6M-6,-16E
2U4H4L12G2D6F2R4NE2D10H2L2H2L4H2
L6G2L4G2L2G2L4BU10R12U2L12U2R12N
R16U2NR16L12U2R12U2L12BR60R12D2L
12D2NL16R12D2L12NL16D2R12D2L12BD
52BL74R8U6L8U4R8BR6R4ND10R4BR6ND
10R8D4L8R2F6BR8U10R8D10NL8BR6U10
F10U10BR6NR8D10R8U6L2"
780 DATA STRONG
785 DATA"BR30BD42R12D2R10D2R6U2R
10U2R12E4U6M-6,-16E2U4H4L12G2D6F
2R4NE2D12L34BU16NR26NU4ND2U2R26B
R22R22NU2ND4D2L22BD56BL52NU10R6N
U8R6NU10BR6NR10U6NR10U4R10BR6ND1
0R10D4NL10D6BR6NU10U6R4NE4F6"
790 DATA WEAK

```

```

795 CLS:V=1
800 FORI=1TO20
805 AO(I)=RND(20)
810 IF N(AO(I))=1 THEN 805
815 N(AO(I))=1:NEXTI
820 FOR P=1TO20
825 CLS
830 PRINT@68,"WHAT IS THE OPPOSI
TE OF"
835 PRINT@132,C$(AO(P))+ " ?"
840 FOR Q=1TO2
845 C(Q)=RND(20):IF C(Q)=AO(P) T
HEN845
850 FOR K=Q-1 TO 0STEP-1:IF C(K)
=C(Q) THEN845
855 NEXTK
860 NEXTQ:C(3)=AO(P)
865 FOR E=1TO3
870 F(E)=RND(3)
875 FOR K=E-1 TO 0 STEP-1:IF F(K)
)=F(E) THEN870
880 NEXTK:NEXTE
885 PRINT
890 PRINTTAB(8)"1-"+B$(C(F(1))):
PRINT
895 PRINTTAB(8)"2-"+B$(C(F(2))):
PRINT
900 PRINTTAB(8)"3-"+B$(C(F(3))):
PRINT
905 G$=INKEY$:IFG$="@"THEN965
910 IF G$=""THEN905
915 G=VAL(G$)
920 IF G<1 THEN 905
925 IF G>5 THEN 905
930 IF C(F(G))<>AO(P) THEN945
935 PRINT:PRINT" RIGHT! THE ANS
WER IS: "+B$(AO(P))
940 NC=NC+1:GOTO955
945 PRINT:PRINT" SORRY! THE AN
SWER IS: "+B$(AO(P))
950 NW=NW+1
955 X$=INKEY$:IFX$<>CHR$(13)THEN
955
960 NEXT P
965 CLS:PRINT@101,"YOU TRIED"NC+
NW"TIMES &":PRINT@165,"ANSWERED"
NC"CORRECTLY"
970 PRINT@229,"WHILE DOING"NW"WR
ONG."
975 NQ=NC+NW:IF NQ=0THEN NQ=1
980 MS=INT(NC/NQ*100)
985 PRINT@293,"YOUR SCORE IS"MS"
%."
990 PRINT@357,"ANOTHER TRY (Y/N/
C) ?";
995 X$=INKEY$:IFX$="Y"THEN RUN
1000 IFX$="N"THENCLS:END
1005 IFX$="C"THEN1015
1010 GOTO995
1015 IFV=1THEN825
1020 IFV=0THEN800

```

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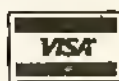
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Last month, we studied the eight directional motion DRAW commands and developed a design on our graph paper screen. That is not the end of CoCo's abilities, however. CoCo can use other directions. CLOAD and run the *Graphic Paper* program you saved onto tape. If your program doesn't have a holding line, type 300 GOTD 300. (Note: When using these new direction commands, first plot the drawing on graph paper.)

Look at Listing 1, but don't copy and run it. You will only get junk. Follow the instructions found in this article and have fun learning this new concept.

Using LHURFDG motion commands you created angular drawings. The results of these artistic efforts, even in PMODE 4, have jagged outlines. You see the telltale step syndrome. To mute these angular forms and give them the semblance of gentle curves, use the M motion command. Use real graph paper to draw the lines as they are explained.

We will now make some changes in last month's *Graph Paper* program. Key in 97 PSET(110,90,3) and run. This is the point of origin, around which we shall build a design. Both horizontal and vertical lines are in increments of 10 (i.e., 0,10,20, to 240). Dark guide lines are in increments of 40 (i.e., 0,40,80, etc.). The dark lines are an overlay to help locate specific points. They are created in lines 80 and 90. You may use them or remove them by inserting a REM in front of the lines.

Look at the graph on the computer screen. Starting at the left margin, we have three white lines and then a dark line. Along the horizontal line that displays the dot, count the first dark line as 40, the next dark line as 40, and the three white lines between (each having a value of 10) as a total of 30. Together the lines total 110.

Count down from the top border, along the vertical line on which the dot is displayed. There are two dark lines with one white line between (90 total).

Delete Line 97 and key in Line 100. Use S40 to make the lines created by the UDLREFGH DRAW command 10 times as large as they appear in the default mode. This way the lines drawn with the

*Modify last month's
program to smooth out
your art work*

New Directions

By Joseph Kolar
Rainbow Contributing Editor

computer are equivalent to lines drawn on real graph paper. Thus, everything you draw on the screen can be duplicated on real graph paper and vice versa.

For this tutorial we will use the coordinates (110,90), oriented so that any line created will begin and end at some intersection where a vertical line crosses a horizontal one. We won't use the guide lines in lines 80 and 90, so mask them with a REM. Unless the color Cx (where x is the color used) is changed, it is only necessary when using the DRAW statement to enter the color in the first program line. CoCo will remember to use the same color until you give it new instructions.

Once we put in the starting point, BM110,90, we can make each successive move begin where the previous move ended. You will see how much easier it is to draw in this manner than to draw lines located by using BMx,y (where x is the horizontal component, and y is the vertical component).

Run the program, study it, press BREAK and type LIST100. The elements that created the line on our screen graph paper were NM+1,2. On the real graph paper, put a heavy dot at an intersection. N tells CoCo that after it moves M+1,2 it must return to its original position (back to the dot). M+1 tells CoCo to move one space in a positive direction — from the starting point of the move, to the right. On your graph paper, draw a line from the dot to the first horizontal/vertical intersection on the right. M+1 is followed by ,2. The 2

or +2 tells CoCo to move down two spaces in the positive vertical direction. Now draw a perpendicular line that starts at the end of the last pencil line and ends at the second horizontal/vertical intersection. Put a heavy dot at the end.

CoCo will draw a line between the two dots, M+1,2 or M+1,+2. The N made the cursor return to its starting point.

To see the lines on the screen, type EDIT100 and press ENTER and X to end. Press the left arrow once to remove the closing quotation mark, type RD2 and enter. Type RUN, and press BREAK. To edit Line 100, use the spacebar to move under the R. Press 3D to remove RD2. Press ENTER and run.

Look at Line 101 in the listing (DRAW "NM+1,-2"). On real graph paper, draw a line in a positive direction (R) from the dot at (110,90). In the program, a comma separates the vertical and horizontal directions. The vertical element is -2 (i.e., it moves up two from the end of the horizontal line just drawn). Draw the line (U2) and make a dot. CoCo will use NM+1,-2 to connect the dots and return. Key in Line 101 and run.

There are two components to these new moves. The first (horizontal) is separated by a comma from the second (vertical) component: Mh,v. If this move is prefixed by an N (NMh,v), the cursor will return to its original position after the move is completed. If the command is prefixed by a B (BMh,v), an invisible line will be drawn. In effect, it is a jump move to a new location.

If the movement of the horizontal is negative, it moves to the left of the starting point. If it is a positive value, the movement is to the right. If the movement of the vertical component is negative, the cursor moves up from the starting point; if it is a positive value, it moves down.

The formula is as follows:

M(+ or -)h,(+ or -)v
M = movement
+h = right
-h = left
, = separates elements
+v = down
-v = up

Key in and list Line 102 (DRAW "NM-1,-2"). We have returned to (110,90). On real graph paper, we will move M-

Florida-based Joseph Kolar is a veteran writer and programmer who specializes in introducing beginners to the powers of the Color Computer.

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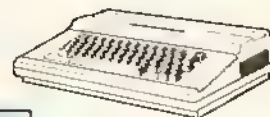
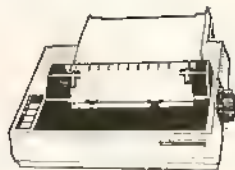
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1, which moves us one unit to the left. Draw in the line and end with a heavy dot. The vertical component is -2, which is two units up. Continue the line you began, moving up two spaces. End with a heavy dot. Connect the two dots. CoCo will draw this line when you run the program.

Next look at Line 103. We move one unit to the left because the first element is -1. Draw the appropriate line. The comma tells us that the next component, 2 or +2, is the vertical element. Draw a line down two units and make a dot. Draw a line between the two dots. CoCo will draw this line and return to its point of origin.

Key in Line 103 and run. You should now have an X on your screen. (To show you the importance of those N prefixes, delete them from lines 100-103. Can you guess what your drawing will look like? Try it! Replace all the N's and let's continue.)

Key in and list Line 110. We keep returning to our original position (110,90) so that our design will emanate from a single point. We are now going to make a two-unit-long X, using the directions, EFGH. Run the program. Now we will make another X that emanates from (110,90) and goes to the following points in succession: (130,100), (130,80), (90,80) and (90,100).

Get out your graph paper. Put a dot at some intersection and label it (110,90). Find the four points listed above, and put a dot at each set of coordinates. Connect them one at a time to the central dot. Use this information to determine the NMh,v locations. Use NM so we can return to (110,90).

When you find the first location, check Line 111. Key in Line 111 and see how you have done. Do the same for the other coordinates and key in lines 112, 113 and 114. We now have a triple X. The temptation is to add the routine, NL2NR2NU2ND2, but we want to be more creative than that.

Key in Line 120. This tells CoCo to draw an invisible line (jump move) two units to the left and one unit up. (CoCo connects the beginning point with the end point.) Then it asks CoCo to make a conventional move, one unit up and, from there, one unit right.

Key in Line 121. BR2 caused the cursor to jump two spaces to the right, and then draw one space to the right of and one space down from the jump. Now work out the other arms of the design, lines 122 and 123. Use your

graph paper to visualize what you are creating. After you key in those lines and run the program, you should have a symmetrical design. We are going to add one-unit lines to the four segments. Key in Line 130 and run.

There is always more than one way to do anything. The simplest way to make this design is to pick the central point (110,90) and proceed as we have already done (the old N ploy).

Your last move ended at (90,100). Pick out an intersection and mark a dot. I usually label the 90 to the left of and the 100 above the dot so I know where I am starting. Since each line is 10 units from the next, I know that to get from 90 to 110 on the horizontal, I must move to the right two units, or M+2. To get from 100 to 90 on the vertical, I must go up one unit, or -1. Run the program.

You will notice that you are able to print over an existing line. I chose to make it invisible with a jump move by prefixing my command with B.

Key in Line 131. Use your graph paper to draw this, so you can visualize the program as you read it. We are back at (110,90). Run the program. Next key in and run Line 140. We moved four units in each direction and made a square.

The last instruction of Line 140 is not NU4, which would return us to the center, but U4, which keeps us in a corner. There is method to our madness. Lines 150 through 157 connect the eight spokes of our drawing in a clockwise direction. Work out the movement statements one at a time using the formula we used earlier. If you look at the tips of the U and E spokes, you can count the three lines between them on the horizontal plane. They are to the right of the center, so they are positive (M+3). Add the comma to separate the components. Note that the E spoke is one unit down (+1). Thus, your direction would be M+3,I or M+3,+1. Continue to calculate the formula for each section until you have completed the octagon. After you complete this, check with the listing to see if your calculations are the same as those in lines 150 through 157.

We will now edit Line 100 and center the design on CoCo's screen at (128,96). Move the cursor under the second I and press 2E to tell CoCo that you want to change the next two characters. Press 2B and SHIFT-up arrow. Move the cursor under the 0 of 90, press C to tell CoCo that one letter will change, enter and run the program.

We now have a pie figure, and we will

paint alternating pieces of this pie. Unmasking the guide lines (80 and 90) will help when locating the coordinates for the PAINT command. Any pair of coordinates in the green background area within the segment are satisfactory.

Look at the coordinates given in lines 170 through 173 of the listing. They are located somewhere in the background. Convert the PSET lines to PSET lines if you want to see the point chosen:

```
170 PSET(132,71,4)
171 PSET(155,109,4)
172 PSET(116,125,4)
173 PSET(105,94,4)
```

Run the program.

When you plan to use the PAINT command, find a point within the boundaries to be painted. Then change the PSET line to a PAINT line in this manner: Change PSET(116,125,4) to PAINT(116,125),4,x, where x is the border color. See how easily you can make the big switch?

Key in lines 170 through 173. You don't have to delete the original lines; use them as a guide and key in the proper data. When you run the program, the guide lines (in Color 4) will block part of your PAINT command. Next, paint the right half of the four "propeller blades" (that is what they look like to me). Use PSET to find points within the boundaries of these blades, and convert the PSET command to a PAINT command. If you would prefer, key in lines 180 through 183 and run. (The program uses Color 1, so there is little difference.)

At this point we want to get rid of the *Graph Paper* program. It is sacrilege to delete it, so we will bypass it. Key in lines 6 and 99 without the REM and run. Now for the masterpiece: Mask lines 6 and 99, key in Line 15 without the REM and run.

Want another masterpiece? Change the foreground from Color 4 to 3 in lines 170 through 173 and from Color 2 to 1 in lines 180 through 183. Unmask lines 6 and 99 and run. Who wants to practice? Gain more confidence in handling your new skill by changing all the fours in Line 140 to fives. Choose a starting point on one of the spokes and link up the eight spokes in lines 150 to 157. The modified program will be in next month's article.

This tutorial is not just a game; it has practical value. Have your utility program ready for the next lesson, and we will create more beautiful works next month. □

The listing:

```

0 'LISTING1
5 CLEAR500
6 'GOTO99
10 PMODE3,1:PCLS:SCREEN1,0
15 'GOTO100
20 A$="D10R240":B$="D10L240"
30 C$="R10D160":D$="R10U160"
40 E$=A$+B$+A$+B$:F$=C$+D$+C$+D$
50 DRAW"C2BM0,0D10R240D10L240D10
R240D10L240"+E$+E$+E$
60 DRAW"BM0,0R10D160R10U160R10D1
60R10U160"+F$+F$+F$+F$+F$
70 DRAW"C4BM0,0R240D160L240U160"
80 DRAW"C4BM0,40R240D40L240D40R2
40D40L240"
90 DRAW"BM40,0D160R40U160R40D160
R40U160R40D160"
99 'PMODE4,1:PCLS:SCREEN1,1
100 DRAW"S40C3BM128,96NM+1,2"
101 DRAW"NM+1,-2"
102 DRAW"NM-1,-2"
103 DRAW"NM-1,2"
110 DRAW"NE2NF2NG2NH2"
111 DRAW"NM+2,1"

```

```

112 DRAW"NM+2,-1"
113 DRAW"NM-2,-1"
114 DRAW"NM-2,1"
120 DRAW"BM-2,-1UR"
121 DRAW"BR2RD"
122 DRAW"BD2DL"
123 DRAW"BL2LU"
130 DRAW"BM+2,-1NH3"
131 DRAW"NE3NF3NG3"
140 DRAW"NL4ND4NR4U4"
150 DRAW"M+3,1"
151 DRAW"M+1,3"
152 DRAW"M-1,3"
153 DRAW"M-3,1"
154 DRAW"M-3,-1"
155 DRAW"M-1,-3"
156 DRAW"M+1,-3"
157 DRAW"M+3,-1"
170 PAINT(132,71),4,3
171 PAINT(155,109),4,3
172 PAINT(116,125),4,3
173 PAINT(105,94),4,3
180 PAINT(144,85),2,3
181 PAINT(144,114),2,3
182 PAINT(116,104),2,3
183 PAINT(115,78),2,3
300 GOTO300

```

RAINBOW review 8/88

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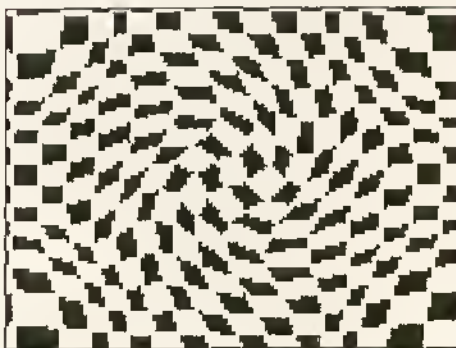
By Patrick D. Grengs II

Gravitational Grid uses several user-entered parameters to simulate a warped checkerboard. These parameters control both the resolution of the display and the characteristic deformations in the grid. Although a joystick allows faster "gravity-center" entry, its use is not necessary.

As you run the program, you will be asked a number of questions. The first of these concerns screen resolution. If you want your display to be animated, press N at the prompt, "High Resolution (Y/N)." Since the animated display must create four consecutive screens, it will take about four times longer to generate an animated display than a high resolution display. The next prompt, "Enter X Linear Step," pertains to the width, in pixels, of each of the displayed checkers. Similarly, "Enter Y Linear Step" designates the height, in pixels, of each checkersquare.

The next prompt asks for the gravity type: Linear or Normal. This deter-

mines the gravity that the checker board will experience during its creation. Linear gravity produces *sharp* blips in the grid while normal gravity produces *smooth* blips.



"<1> Points <2> Grid <3> Checkers" asks for the type of grid to be created. While the Points option produces a grid composed of points where the vertices should be located, Grid creates the actual grid, with corresponding vertices connected by line segments. Checkers creates a grid with every other region filled in. If you choose the Checker option, you will be asked to enter a filling — paint or linear. If you choose the Paint option, every other block will be filled using CoCo's PAINT command.

If you choose the Linear option, a *filling* algorithm will be used to fill alternating blocks. The time requirement for this algorithm is costly, so only use this option on complex grids. (If the PAINT command is used on complex or folded grids, too many blocks may be accidentally painted.)

Those of you who want to create an animated display will also be asked for the horizontal and vertical direction of movement on the grid.

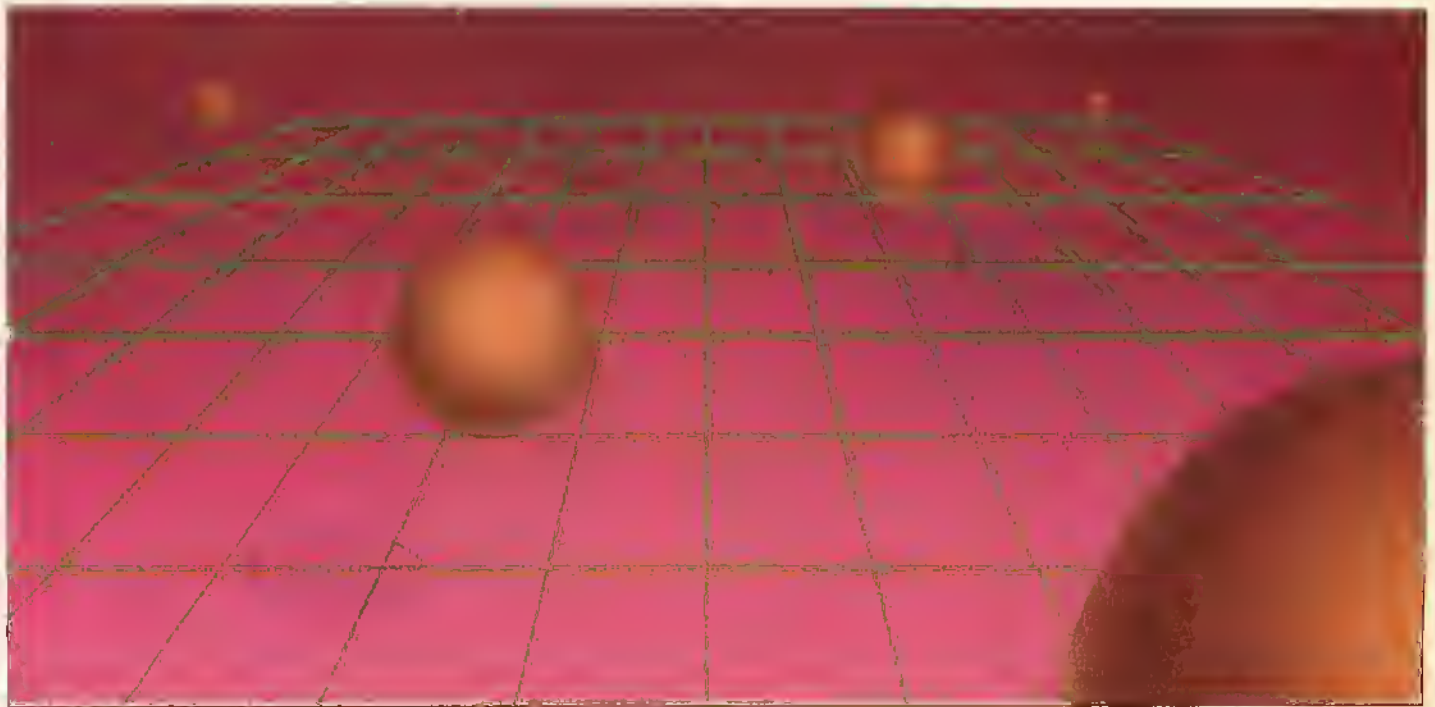
Finally, you must choose the size (magnitude) of the blips and the degree of twist imposed on them.

After the numeric parameters have been entered, each blip's center must be defined. To do this, move the cursor to the point at which you want to place a center of gravity. Press the space bar or joystick button. Now move the dot to the outer region of influence. (The distance between the center and outer region is called the *radius of influence* of the blip.) You now have four choices:

Press U for an upward blip — the top of the grid will appear pushed up at one point.

Press D for a downward blip — the grid will appear pulled down at one point.

Patrick Grengs, a math and computer science major, works part-time at 3M's CAD/CAM center. Patrick enjoys graphics and animation programming on his CoCo.



Press R for a right twist — a *tornado*, moving in a clockwise direction, will appear on the grid.

Press L for a left twist — The *tornado* will move in a counter-clockwise direction on the grid.

A circle, which indicates the radius of influence, will appear after each blip is completed. Press ENTER after all blips have been defined. The screen will be cleared and the grid created.

A number of nested FOR NEXT loops control the grid creation process, but the key to the program is the gravity and twisting algorithms. The gravity algorithms push or pull the grid's vertices toward or away from the various centers of gravity. The distance is determined by a distance function: The further the vertex is from the center of gravity, the less the vertex will be affected. With Linear Gravity, the function is directly proportional to the distance between the vertex and the center of influence. With Normal Gravity, the effect is based on a simple sinusoidal function of distance. Normal Gravity will produce more realistic deformations in the grid.

The twisting algorithms rotate the vertices of the grid in either a clockwise or counter-clockwise manner. The angle of rotation is based on the distance. Linear Twisting gives us an angle di-

rectly proportional to the distance. The angle from Normal Twisting is based on a sinusoidal function of distance. As with Normal Gravity, Normal Twisting produces more realistic results.

Here are the parameters for a generic animated grid:

Prompt Question:	Answer:
High Resolution (Y/N):	N
Enter X Linear Step:	16
Enter Y Linear Step:	12
Gravity Type:	2 (Normal)
1.Points 2.Grid	
3.Checkers:	3
Filling:	1 (Paint)
Horizontal Direction:	2 (Right)
Vertical Direction:	2 (Down)
Enter Magnitude:	1
Max. Angle Twist:	90

Enter a blip at the screen's center, with a large radius of influence. Use either gravity or twisting as the force on the grid. Press ENTER. Now go and get yourself a cup of coffee, since it will take about a half an hour to create your animated display.

In order to save your high-resolution/animated display, press BREAK to exit from the display, and use these commands for each of the following:

- Enter CSAVEM"filename",1536,

7679,0 to save a high-resolution grid onto tape.

- Enter SAVEM"filename",3584,9727,0 to save a high-resolution grid onto disk.
- Enter CSAVEM"filename",1536,13833,0 to save an animated grid onto tape.
- Enter SAVEM"filename",3584,15881,0 to save an animated grid onto disk.

Use the following procedure to view any files you save:

1. RUN "GRAVGRID".
2. Press BREAK.
3. LOADM"filename".
4. Type GOTO 190, and press ENTER
5. Control the keyboard speed using A through Z. Pressing A creates a fast display. The farther you move through the alphabet, the slower your display will become.

I hope that you enjoy *Gravitational Grid* and its demonstration of the CoCo's graphics display power. I welcome any improvements or questions you might have about the program.

(Questions or comments regarding this program may be directed to the author at 375 West Hathorn, River Falls, WI 54022. Please enclose an SASE when requesting a reply.) □

✓	57.....2	370.....106
	69.....70	920.....205
	150.....205	END.....12
	194.....48	

The listing: GRAVGRID

```

Ø GOTO 2
1 GOTO 5
2 PCLEAR 8
3 GOTO 1
5 -----
  GRAVITATIONAL GRID
  VR: 3.1
  BY: PATRICK D. GRENGS II
  DECEMBER , 1985
  RV: JULY 27, 1986
  -----
1Ø CLEAR2ØØ:PLAY"L255"
15 E$=STRING$(32,128)
16 PI=ATN(1E+9)
2Ø DIM X(5Ø),Y(5Ø),D(5Ø),V(5Ø),
  G(5Ø),XT(256),YT(192),N(1)
25 GOSUB9ØØ
3Ø IF H$="Y" THEN 45
32 R1=XS/4*XM:IF XM=1 THEN
  S1=-3*R1 ELSE S1=Ø
34 R2=YS/4*YM:IF YM=1 THEN
  S2=-3*R2 ELSE S2=Ø
45 P$="O5V15CAFDB"
5Ø PMODE4,1:PCLS:SCREEN1,1
52 X=128:Y=96:TG=Ø
55 IF JOYSTK(Ø)<9 AND X>7 THEN
  X=X-8
56 IF JOYSTK(Ø)>54 AND X<248THEN
  X=X+8
57 IF JOYSTK(1)<9 AND Y>7 THEN
  Y=Y-8
58 IF JOYSTK(1)>54 AND Y<184THEN
  Y=Y+8
6Ø IF(PEEK(343)AND8)=Ø AND X>1
  THEN X=X-2
61 IF(PEEK(344)AND8)=Ø AND X<254
  THEN X=X+2
62 IF(PEEK(341)AND8)=Ø AND Y>1
  THEN Y=Y-2
63 IF(PEEK(342)AND8)=Ø AND Y<19Ø
  THEN Y=Y+2
65 PUT(X,Y)-(X+1,Y+1),N,NOT:PLAY
  "L255":PUT(X,Y)-(X+1,Y+1),N,
  NOT
67 IFPEEK(345)<>255 AND TG=ØTHEN
  TG=TG+1:A=X:B=Y:PUT(A,B)-(A+1,
  B+1),N,NOT:PLAYP$:GOTO 55
68 I$=INKEY$:IF(I$="U" OR I$="D"
  ) AND TG=1 THEN C=C+1:X(C)=A:
  Y(C)=B:D(C)=SQR((A-X)^2+(B-Y)
  ^2)*MM:PUT(A,B)-(A+1,B+1),N,
  NOT:CIRCLE(A,B),D(C):PLAYP$:
  G(C)=1:IF I$="U" THEN V(C)=-1
  :GOTO52 ELSE V(C)=1:GOTO52
69 IF(I$="R" OR I$="L") AND TG=1
  THEN C=C+1:X(C)=A:Y(C)=B:D(C)
  =SQR((A-X)^2+(B-Y)^2):PUT(A,B)
  -(A+1,B+1),N,NOT:CIRCLE(A,B)
  ,D(C):PLAYP$:G(C)=2:IF I$="R"
  THEN V(C)=1:GOTO52 ELSE V(C)=
  -1:GOTO52
7Ø IF I$<>" " THEN IF ASC(I$)=13
  THEN GP=C:GOTO1ØØ
71 GOTO55
1ØØ PCLS
11Ø IF H$<>"Y" THEN FOR PM=1 TO
  7 STEP 2:PMODE2,PM:SCREEN1,1
  :PCLS:J=Ø:CC=Ø
115 FOR K=S2-YS*1 TO 192+YS STEP
  YS:J=J+1:X=S1-XS:Y=K:ON G
  GOSUB5ØØ,51Ø:XT(J)=X:YT(J)=Y
  :NEXT
12Ø FOR X1=S1 TO 256+XS STEP XS:
  Z=Ø:CC=CC+1:IFCC=2 THEN CC=Ø
121 C=CC
125 X=X1:Y=S2-YS:ON G GOSUB5ØØ,
  51Ø:XT=X:YT=Y
13Ø FOR Y1=S2 TO 192+YS STEP YS:
  C=C+1:Z=Z+1
135 X=X1:Y=Y1:ON G GOSUB5ØØ,51Ø:
  PSET(X,Y,5):IF CH>1 THEN
  LINE(XT(Z),YT(Z))-(XT,YT),
  PSET:LINE-(X,Y),PSET:LINE-
  (XT(Z+1),YT(Z+1)),PSET:LINE-

```

CoCo Cat By Logan Ward



```

      (XT(Z),YT(Z)),PSET
140 IF CH=3 AND C/2=INT(C/2)
      THEN ON PT GOSUB170,171
142 XT(Z)=XT:YT(Z)=YT:XT=X:YT=Y
145 NEXT Y1:XT(Z+1)=X:YT(Z+1)=Y:
      NEXT X1
150 S1=S1+R1:S2=S2+R2
160 IF H$<>"Y" THEN NEXT PM:
      GOTO190
165 GOTO999
170 PAINT((XT(Z)+XT+X+XT(Z+1))/4
      ,(YT(Z)+YT+Y+YT(Z+1))/4),1,1
      :RETURN
171 D=0:D1=X:D2=XT:GOSUB290:
      D2=XT(Z):GOSUB290:D2=XT(Z+1):
      :GOSUB290:D1=XT:GOSUB290:
      D1=XT(Z):GOSUB290:D2=XT:
      :GOSUB290
172 D1=Y:D2=YT:GOSUB290:D2=YT(Z):
      :GOSUB290:D2=YT(Z+1):GOSUB
      290:D1=YT:GOSUB290:D1=YT(Z):
      :GOSUB290:D2=YT:GOSUB290
175 D=D+.0001
177 X3=(XT(Z+1)-XT(Z))/D:
      Y3=(YT(Z+1)-YT(Z))/D:
      X4=(X-XT)/D:Y4=(Y-YT)/D
179 A1=XT(Z):B1=YT(Z):A2=XT:
      B2=YT
180 FOR I=0 TO D:LINE(A1,B1)-
      (A2,B2),PSET:A1=A1+X3:B1=B1+
      Y3:A2=A2+X4:B2=B2+Y4:NEXT:
      RETURN
190 'DISPLAY FRAMES
192 X$=INKEY$:T=10
194 FOR P=1 TO 7 STEP 2:PMODE2,P
      :SCREEN1,1:I$=INKEY$:IF I$<>
      ""THEN T=ASC(I$)*4-256
196 FORI=1 TO T:NEXTI,P:GOTO194
199 FOR P=1 TO 7 STEP 2:PMODE2,P
      :SCREEN1,1:NEXT:GOTO199
200 'LINEAR GRAVITY
220 IF D<D(I) THEN DF=(D(I)-D)/
      D(I):A=A+V(I)*(X(I)-X)*DF:
      B=B+V(I)*(Y(I)-Y)*DF
230 RETURN
250 'NORMAL GRAVITY
270 IF D<D(I) THEN DF=(D(I)-D)/
      D(I):DX=(X(I)-X):A=A+V(I)*
      (DX-DX*SIN(PI*D/D(I))):DY=(Y
      (I)-Y):B=B+V(I)*(DY-DY*SIN
      (PI*D/D(I)))
280 RETURN
290 'RETURN MAX
295 E=ABS(D1-D2):IF E>D THEN D=E
296 RETURN
300 'LINEAR TWIST
340 IF D<D(I) THEN AG=AN*V(I)*
      (D(I)-D)/D(I):X4=X-X(I):Y4=
      Y-Y(I):X=X4*COS(AG)-Y4*SIN
      (AG)+X(I):Y=X4*SIN(AG)+Y4*
      COS(AG)+Y(I):A=A+X5-X:

```

```

      B=B+Y5-Y
350 RETURN
370 'NORMAL TWIST
410 IF D<D(I) THEN AG=AN*V(I)*
      (1-COS(PI*(D(I)-D)/D(I))):
      X4=X-X(I):Y4=Y-Y(I):X=X4*
      COS(AG)-Y4*SIN(AG)+X(I):Y=
      X4*SIN(AG)+Y4*COS(AG)+Y(I)
420 RETURN
500 A=0:B=0:FOR I=1 TO GP:D=SQR(
      (X-X(I))*(X-X(I))+(Y-Y(I))*
      (Y-Y(I))):ON G(I) GOSUB 200,
      300:GOTO520
510 A=0:B=0:FOR I=1 TO GP:D=SQR(
      (X-X(I))*(X-X(I))+(Y-Y(I))*
      (Y-Y(I))):ON G(I) GOSUB 250,
      370
520 NEXT I:X=X+A:Y=Y+B:IF X<0
      THEN X=0 ELSE IF X>255 THEN
      X=255
525 IFY<0 THEN Y=0 ELSE IF Y>191
      THEN Y=191
530 RETURN
900 CLS0
910 PRINT@4,"=< GRAVITY INFLUXO
      R >=";
915 PRINT@96,"HIGH RESOLUTION (Y
      /N)":INPUT H$
920 PRINT@128,"ENTER X LINEAR ST
      EP:":INPUT XS:IF XS<1 OR XS>64
      THEN PRINT@128,E$:GOTO920
930 PRINT@160,"ENTER Y LINEAR ST
      EP:":INPUT YS:IF YS<1 OR YS>64
      THEN PRINT@160,E$:GOTO930
950 PRINT@192,"GRAVITY TYPE: 1>L
      INEAR 2>NORMAL":INPUT G:IF G<1
      OR G>2 THEN PRINT@192,E$:E$:
      :GOTO950
955 PRINT@224,"<1> POINTS <2> GR
      ID <3> CHECKERS":INPUT CH
957 IF CH=3 THEN PRINT@256,
      "FILLING: 1>PAINT 2>LINEAR":
      :INPUT PT:IF PT<1 OR PT>2
      THEN PRINT@256,E$:GOTO957
959 IF H$="Y" THEN 970
960 PRINT@288,"HORZ. DIR. 1-LEFT
      2-RIGHT":INPUT XM:IF XM<1 OR
      XM>2 THEN PRINT@288,E$:GOTO
      960
962 XM=XM*2-3
965 PRINT@320,"VERT. DIR. 1-UP 2
      -DOWN":INPUT YM:IF YM<1 OR YM>2
      THEN PRINT@320,E$:GOTO965
967 YM=YM*2-3
970 PRINT@352,"ENTER MAGNITUDE:"
      :INPUT MM:IF MM=0 THEN MM=1
980 PRINT@384,"ENTER MAX. ANG. T
      WIST:":INPUT AN
985 AN=AN/90*PI
990 RETURN
999 SCREEN1,1:GOTO999

```


RAINBOW

Give us your best: Join the ranks of these courageous CoCoists in showing the Color Computer world your high score at your favorite micro-diversion. We want to put your best effort on record in THE RAINBOW's "Scoreboard" column. All entries must be received 60 days prior to publication. Entries should be printed — legibly — and must include your *full* name, address, game title, company name and, of course, your high score. Each individual is limited to three score entries per month. Send your entries to Scoreboard, c/o THE RAINBOW.

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100,500 ★Richard Winkelsbeaur, Bronx, NY

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72,410 Glenn Hodgson, Aberdeenshire, Scotland
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63,014 Rebecca Henderson, Ballston Spa, NY

62,702 William Currie, Bryans Road, MD

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1,666,100 ★Stephane Martel, Laval, Quebec
623,550 Dale Kruager, Maple Ridge, British Columbia

75,000 Blake Cadmus, Reading, PA
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73,346 Jean-Francois Morin, Loretteville, Quebec

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68,142 Cooper Valentin, Veenby, British Columbia

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49,254 David Brown, New Waterford, Nova Scotia

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43,369 Jason Kloosira, Jenison, MI
41,895 Antonio Hidalgo, San Jose, Costa Rica

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357,890 Jason Clough, Houston, TX
328,820 Bernard Burke, Lee's Summit, MO
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169,410 Danny Dunne, Pillsfield, NH

GANTELET (Diacom Products)
45,235,820 ★Ken Hubbard, Medison, WI
23,643,720 Geron Stelker, Rivordelo, GA

20,921,490 Randall Edwards, Dunlap, KS
10,222,940 Clinton Morell, Sacramento, CA
7,493,340 Stirling Dell, Dundelk, Ontario

515,980 Matthew Heid, Filaleke, MI

GANTELET II (Diacom Products)
17,701,060 ★Bryan Ball, Manasses, VA

GHANA BWANA (Radio Shack)
2,350,750 ★Michael Heltz, Chicago, IL
702,520 Joseph Delaney, Augusta, GA

282,070 Kelly Jones, West Salem, OH
105,820 David Reesh, Hadley, PA

GIN CHAMPION (Radio Shack)
1,120-0 ★Kim Johns, Port Cog., British Columbia

GRANDPRIX CHALLENGE (Diacom Products)
67,710 ★H. Dingwell, Litchfield, CT

GRDBDT (Children's Computer Workshop)
9,665 ★Wendy Staub, Moundsville, WV
8,090 Curt Lebel, Louisville, KY

HELICOPTER HERO (THE RAINBOW, 3/88)
103 ★Phil Holsten, Moraga, CA

HITCHHIKER'S GUIDE TO THE GALAXY (Infocom)
400/359 ★Roy Grant, Toledo, OH
400/422 Jeff Holthem, Waterloo, Ontario

400/510 Brad Wilson, Lithia Springs, GA

INTERBANK INCIDENT (Radio Shack)
4,861 ★Share and Chris Eulon, Lilburn, GA

IRON FOREST (Diacom Products)
3,173,200 ★Charles Boyd, Amerillo, TX
2,678,300 Janel Boyd, Amerillo, TX

1,141,650 Craig Pennell, Amarillo, TX
1,013,100 William Weller, Kallua, HI
595,700 Deniel Wibier, Santa Rose, CA

JOKER POKER (THE RAINBOW, 3/87)
62,067,906 ★Carole Rueckert, Mansfield, OH
21,733,284 Jon Fogarty, Yele, MI

8,179,710 Brenda Kim, Athens, OH
3,796,898 Curtis Trammel, Murphysboro, IL
2,793,285 Blein Jamiason, Kingston, Ontario

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183,675 ★Rush Coley, Port Orchard, WA
162,555 Martin Parade, Arcadia, CA
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9,016 Heather Richwalski, Madford, WI
8,756 Gail Bacon, Middletown, CT
8,199 Eric Mellen, Newark, DE
6,404 David Hartmann, Osoyoos, British

Columbia

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1,418 *Edward Kavanaugh, North Easton,

MA
1,414 Sara Mittelstaedt, Kiel, WI
1,122 Phil Helsten, Morga, CA

MISSION: F-16 ASSAULT (Drecom Products)

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355,570 Slirling Dell, Dundalk, Ontario
318,150 Jeremy Pruski, Sandwich, IL
144,510 Donald Cathcart, Halifax, Nova Scotia
137,920 Mike Grant, Fresno, CA

MISSION: RUSH'N ASSAULT (Drecom Products)

361,750 *Clay Jones, Wooster, OH
195,250 Kelly Jones, West Salem, OH

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16,220 *Christopher Cromwell, Monument,

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164,088 John Akan, Chippewa Falls, WI
159,400 David Cornelle, Green Bay, WI
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ZDNX (THE RAINBOW, 10/85)

12,000 *Adam Broughton, Morris, PA

— Angela Kapfhammer

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints, tips or responses to questions, or want help yourself, we encourage you to write to the Scoreboard, c/o THE RAINBOW.

In response to questions from:

• George Lane: In order for you to complete your quest in *Sands of Egypt*, you must drop the scepter. When the computer says where, type ON MUMMY. After you do that, type GO CRACK, get the ladder and type GO CRACK again. In *Dallas Quest*, type PULL CURTAIN.

In *White Fire of Eternity*, I have the ring and I need the pick, but I do not know how to get it.

Michael Duvall
Zanesville, OH

• Troy Ferguson: In order to kill the gargoyle in *Raaka-Tu*, you first have to get the burning lamp and the candle. After you get these two items, go back into the room and go north until the gargoyle comes at you. Type LIGHT CANDLE WITH LAMP and immediately leave the room after you drop it.

When you get to the vault and decide to go inside, whatever you do, don't pull the handle.

How do you get past the bronze gates?
Tracy Nahas
New London, CT

• Dan Breault: In *Gates of Delirium*, the people are located in towns, except two; they are located in a dungeon and a castle. The dungeons are the guardians of all but one of 10 gate keys. These gate keys will be needed to win the game. The shrines are in the second world 18 levels below Twin City I. Use the Moon Gates to get to Twin City I. Enter the dungeon inside the town, but make sure you have all your party with 2,400 hitpoints or the depths of the dungeons will kill you.

Duane Whitlock
North East, MD

• Mike Duvall: To get the palm fronds in *Sands of Egypt*, you must go to the pool. From the cliff, go down, west, south and east. Type GO TREE and you'll be at the palm tree. Drop all the items and type CLIMB TREE. At the top of the tree, type GET DATES. Climb down and get your items. Go south and then east. At the pool, type FEED CAMEL and he will kneel so you can mount him. Ride the camel and dismount him. You will be at the pyramid. Climb it and get the axe. Go back to the pool by riding the camel. Go to the tree and climb it with the axe. At

the top, type CHOP FRONDS. Get the fronds and go down. Type BRAID FRONDS and you will have a sturdy rope.

Shawn Maloney
Ozone Park, NY

• Jim Barkel: In *Downland*, to get off the rope, go to the right end and push the joystick over to the right while pushing the button. As soon as you are on the slatted part, push the handle to the middle, then push to the right and you'll be on the rope.

In Chamber 6, what is the rope used for when you first walk in?

David Breyer
Cincinnati, OH

Scoreboard:

In *Bedlam*, after getting stuck with the hypodermic needle and returning to your cell, to stop running into the walls type PLUGH and you will return to your normal self again.

To get Houdini down, type UNTIE HOUDINI. How do you get the strait-jacket off him?

How do you wake up the "real doctor" lying unconscious in the corner?

Jerry Hagerty
North Syracuse, NY

Scoreboard:

How do you get Roger the Rogue Elephant to cooperate in *Dallas Quest*? How do you get past the cannibals in order to enter the cave?

Eric Costello
Pine Bluff, AR

Scoreboard:

In *Dallas Quest*, if you want to get the flashlight, you have to pull the curtain in the trading post.

In *Dragon Blade*, how do you get past the stone door after the whirling pool?

Eric Vermette
La Tuque, Quebec

Scoreboard:

I have successfully landed the Heart of Gold on Magrathea in *Hitchhiker's Guide to the Galaxy*, but I cannot unjam the hatch or enter the screening door.

John Knight
Kalamazoo, MI

Scoreboard:

In the *Interbank Incident*, how can I get into the Air Force base in Germany?

In *Euchanter*, how do I find water?

In *Sands of Egypt*, where can I find the scepter?

Kristy Craig
Little Rock AFB, AR

Scoreboard:

In the *Interbank Incident*, I found the code book, computer, disk, cartridge and the IBC special card, but I am not able to find the secret hideout. Please help.

In *To Preserve Quandic*, how do I pass the helicopter on the roof?

Georges Fortin
Baie-St. Paul, Quebec

Scoreboard:

In the *Interbank Incident*, I can't seem to find the crooks.

In *Dallas Quest*, after you enter the barn with the owl, you must kill the rat by typing DROP OWL.

In *Sands of Egypt*, the magnifier is used to light the torch from the sun's rays.

Katie Miller
Chino, CA

Scoreboard:

In *Madness and the Minotaur*, in order to get the third spell, I must tie the Hydra up so I can enter the room with the parchment, but after I get the spell, I am told that I need the rope for the next spell. Is there a way to untie the Hydra or to kill it so I can get the rope back?

Duane Whitlock
Northeast, MD

To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers," c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will share your reply with all "Scoreboard" readers in an upcoming issue.

For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type SEND and address to: EDITORS. Be sure to include your complete name and address.

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NIGHT OF THE LIVING DEAD

Software

CoCo 1, 2 & 3

Night of the Living Dead — An Interactive Nightmare

Apparently you were wrong about that road you thought was a shortcut a couple of hours ago.

You've managed to get yourself totally lost, and it's looking less and less likely that you're going to make it back to school in time for your first day of classes tomorrow.

The only person you've seen for miles is the hitchhiker you picked up over an hour ago. She says her name is Sheena.

Night of the Living Dead begins innocuously enough, but just wait a few minutes. You see, the dead are waking up — they're very hungry. And your car is out of gas.

Night of the Living Dead from Adventure Novel Software is a two-disk text Adventure for 64K ECB disk-based CoCos. Unlike the movie of the same name (zombies are the only thing in common), it begins with your character stranded in the middle of nowhere. Without gas, your 1970 Mercury Montego "might as well be a rabbit." You're stuck with a strange woman who wears a Frank Zappa T-shirt and is by turns threatening and polite.

To the east is a cemetery and a church. To the west is an impenetrable thicket. To the north and south the gravel road stretches endlessly and will

take you nowhere. But things don't seem hopeless, at least not until a heavily made-up man (like a corpse?) with a gaping hole in his neck shambles toward you. What to do? *I* tried running, but there's nowhere to run.

Adventure Novel Software says that the only goal in *Night of the Living Dead* is to stay alive, which is not an easy feat. I'm embarrassed to tell how far I got — and I even had help.

Unlike most games, there is more reward in solving this Adventure than just the satisfaction in knowing you've done it: A cash prize of \$500 is offered to the first person who "survives." To win, an Adventurer must be a registered owner and send in a transcript or written solution by registered mail. The correct entry with the earliest postmark wins. If by December 31, 1988, there is no winner, one will be chosen at random from the owner registration cards mailed back.

Needless to say, I do not have a ghost of a chance of claiming the loot. I died more times than I can remember, and in the most horrible ways. The further along I got, the more spectacular my deaths.

"If you are faint of heart or squeamish of stomach, I recommend you not try this game. Literally, heads will roll."

In my very first death my head struck a sharp object; fortunately, I died immediately. For my second death, I was treated to a screwdriver through the skull (watch out for that man with the gaping hole in his neck). In my third death, my jugular was ripped open and the last thing my dying eyes saw was a zombie having my arm for lunch. For the benefit of those of you swallowing to hold back your last meal, I shall refrain from regaling you with more vivid accounts of my demises.

Night of the Living Dead provides some pretty grotesque descriptions. If you are faint of heart or squeamish of stomach, I recommend you *not* try this game. Literally, heads will roll. And there are colorful descriptions of oozing flesh and sucking sounds (sorry, I had to throw that in) — yet Adventure Novel Software's Bob Schuette says that the gory descriptions have even been toned down in the latest version!

When you see the disk jackets (or if you've seen the Adventure Novel Software ad), you may wonder where "Savage Software" fits into the scheme of things. "Savage Software" is Curtis Fennell, the "editorial" half of *Night of the Living Dead* — Adventure Novel and Schuette are the programming half.

Descriptions of the character's current location are provided at the top of the screen above a black bar. A "clock" in the upper-right corner keeps track of the time and moves. As this is a text Adventure, there are no graphics (Schuette and Fennell say graphics wouldn't do the story justice — your imagination serves better). Text is shown on the 32-character screen. The

Putting the Savage in Savage Software (And the Novel in Adventure Novel)

There are a lot of people who would just as soon read a good book as go to a movie. Some writers can evoke images more vivid than any movie screen can. From his narrative in *Night of the Living Dead*, Curtis Fennell, known to the CoCo market as Savage Software, has shown he is one such writer.

Curtis and Bob Schuette, the writing and programming team behind *Night of the Living Dead*, have been friends since college. It was during those years that Curtis first found out about a new form of computer entertainment — Adventure games. Back then, the games were in their infancy. Even the better ones limited players to two-word commands, and the puzzles did not always make a lot of sense.

When Bob recently contacted Curtis about writing an Adventure for the CoCo, he had no idea that Curtis was already working on one. The game design systems Curtis tried were limiting, and he was invariably disappointed in how the final product worked.

So they decided to join forces. Using Bob's Adventure Novel design system, Curtis brought *Night of the Living Dead* to life. It was a challenge for Curtis to develop the story line without going overboard in grotesque descriptions. Much of the debugging process, in fact, involved rewriting text some players found unappealing. Graphics were removed from the game because they simply could not do it justice. "Without question, the scariest visions exist in the player's own mind," Curtis says.

Schuette believes his exclusive game design system will provide a fresh, new outlook for Adventures. "We're in the

business of entertainment. Our goal is to supply the computer industry with unique games that, while challenging, can be solved by most players," he explains.

"Don't get me wrong. These games will never be pushovers. The players will definitely get their money's worth from us. But I also don't want them to get so completely stumped and frustrated that they never get the full enjoyment from finishing the game on their own." A self-taught programmer and chemical engineer, Bob's experience ranges from writing game software to programming industrial process controllers. But he has found some innovative uses for the CoCo: "As an avid fan of windsurfing, I'm constantly interested in what the wind is doing — how fast it is blowing, and whether it is picking up or falling off. By rewiring an old DC motor and putting a set of anemometer cups on it, I can constantly monitor the wind speed through my CoCo joystick port. It's kept me from making quite a few useless trips to the lake."

Bob still uses one of the original 64K CoCo 1s and says he has never experienced a failure, even after he has left it on for weeks at a time. This love of his CoCo 1 helped Bob decide to keep his games compatible with all three CoCos.

"I've had some opportunities to work with the new CoCo 3, and I think it is a fine machine," he says, "but I'm sure there are many people out there who want to stay with the older models. It would be a shame if all the new software developed was designed specifically for the CoCo 3. At least for now, you can be sure that one company will still be producing software for all three CoCos." □

game is disk-intensive — so leave the Data disk in the drive.

Game play is typical for Adventures of the verb-noun command variety. But commands of many more than two words may be given. There is a help function that shows how to use a variety of commands. You can talk to the characters, question them or ask them to perform a specific task, e.g.: SHEENA, TELL ME ABOUT FRANK ZAPPA.

The usual command abbreviations are supported (N, S, E, W, U and D). The "examine" command can be shortened

to X, the "inventory" command to I. Also, there is no inventory limit. The SCRIPT command sends all text to the printer.

I am not very experienced with Adventures and so was frustrated when sometimes my "interpreter" would not recognize a reference to something it informed me of just a few moves earlier, or when it wouldn't understand something I thought was totally obvious. A quick rereading of the help screen yielded this advice: "If the game does not understand a verb, try a synonym

Zombies 10, People Zip

No, you fool! Stay away from that door — don't go in there! Oh, well, another one bites the dust.

How many times have you watched a hack-and-slash movie and actually cheered for the monster because the characters are so *stupid* they deserve to die?

I mean, if you're staying in a hotel (or a summer camp) where a body count is taken daily, would you traipse off la-ti-da by yourself to the remotest, spookiest place around and then appear *surprised* when the ax falls? Would you even stick around after the first body is found? Not me — I'd get the @#\$\$% outa there! You think that you would, too? We think we're so smart. In their shoes, we wouldn't be so stupid, and we'd live a lot longer.

We can be smug in our superiority most of our lives. It is doubtful we'll be menaced by Jason, Freddy or Zombie (thank God!). But *what if?* What if by some means we could pass through the other side of the camera lens and put our wits on the line against the ghoulies.

Night of the Living Dead and *Adventures* like it let us do this. I tried the game, and I wasn't very successful at surviving. I now have new respect (or sympathy, at least) for those stupid people who blunder boldly into the attic, the cellar

and the cemetery. You see — they had no choice. The script wouldn't let them back out and run.

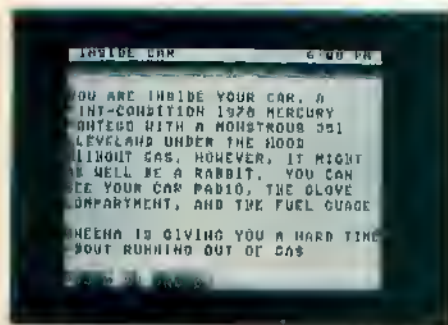
In playing *Night of the Living Dead*, as I knew the goal was to "survive," I thought I would just run up the gravel road until I was safe (zombies are rather sluggish, you know). Well, the game wouldn't let me. It forced me into a situation and made me follow its "script." Of course, how I acted within the confines of the situation was up to me — so I promptly got knocked off.

I knew the zombie was steadily creeping up on me, but what was I doing? Checking out the scenery, examining my inventory for a possible weapon, twiddling my thumbs. If I were a character in a horror movie, the audience would probably be cheering my imminent demise. I feel two sayings are applicable here (I'm fond of sayings): "Don't knock something 'til you've tried it," and "Don't criticize unless you've been in someone else's shoes."

And now for the moral of this lunacy: "Don't make fun of horror movie victims just because they walk into obvious traps — unless you've survived *Night of the Living Dead*."

Have a happy Halloween, and watch out for zombies. □

for it." (Hint: SEARCH is sometimes more revealing than EXAMINE.)



The SAVE command allows you to stop and save your progress at any game prompt — this is very handy, as it "saves" you from having to start back from the beginning of the game every time you die (which, if you are like me, you will do frequently). When you type SAVE, a mini-menu pops up that prompts you for the drive of your "save" disk, then for the game number — you can save five.

After you die, you are asked if you want to restore a previously saved

game. If you do, a similar menu prompts you for the drive and the game number. If you indicate you *don't* want to restore a game, you must do a cold start to get back to Disk BASIC.

I tried *Night of the Living Dead* on a CoCo 1, 2 and 3, and it worked fine on all. The only thing it wouldn't work on was an old, gray-case E-board CoCo 1, and that was because of the high-speed poke, I suspect. But most CoCo-ists will be able to play the game.

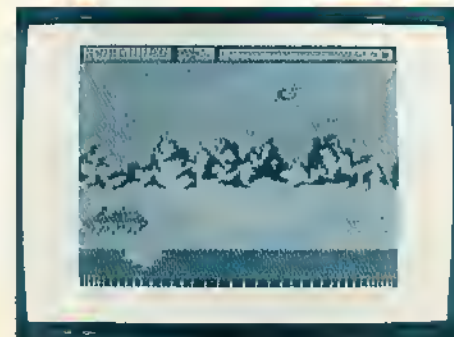
I found *Night of the Living Dead* fun to play, and I especially appreciated the exciting and smooth narrative flow — this Adventure reads better than most. I expect that those who are fans of zombie movies will like the game, and connoisseurs of "ordinary" Adventures will get a kick out of it, too.

(Adventure Novel Software, P.O. Box 8176, Spartanburg, SC 29305, 803-578-7421; \$34.95 introductory offer: First product review from this company appearing in THE RAINBOW)

— Lauren Willoughby

Moon-Runner — Souped-Up Lunar Buggy

In *Moon Runner* you command an amphibious patroller armed with laser and overhead missiles. Your mission is to battle enemy forces across the lengths of eight moons and then destroy the Trigan base.



Opposing you is an array of strong enemy forces, including attacking spacecraft, tanks, mines and surface rockets. Even the moon's surface is against you. There are crevices, rocks, trees and cacti among the obstacles you must either jump over or destroy.

While you have nine patrollers to accomplish your mission, they are thin-skinned craft and easily destroyed. When they are gone, the mission is terminated. Also, the patrollers use up fuel quickly. To keep going, you must shoot down the fuel satellites that orbit the moons.

Once you have fought your way to the Trigan base, the game gets harder! You must blast holes in the rotating force shield protecting the Trigan generator. This is not easy — the base shoots back! Because your laser is short-ranged, you must move close to the base, firing your laser constantly. It's a heavyweight slugfest.

Moon Runner is a well-crafted program that takes up a full disk. You must leave the disk in the drive while you are playing because the program accesses the disk throughout the game. Since the nine top scores are recorded, do not write-protect the disk.

Besides joystick control, you also have two keyboard controls. The ENTER key pauses the action, as well as resumes game play. The Q key ends a particular game (your patroller blows up!). You

are returned to the main menu to begin again.

The game has complete instructions and is easy to play, but hard to master.

A nice programming touch is the flexibility with which you can play at different levels. For example, if you complete Level 2, you can select levels 3, 2 or 1 to play next. A frustration with most arcade games is losing all your men, tanks, etc., and having to start all over again. That's boring — *Moon Runner* is not!

This is one good arcade game. It runs on the CoCo 1, 2 and 3, with RGB or composite monitors. You will need 32K, one disk drive and a joystick. The scrolling graphics and animation are exceptional, and the CoCo 3 version makes use of the PALETTE command.

For its combination of affordability and playability, *Moon Runner* is one first-class addition to the CoCo library.

(Nick Bradbury, 10500 Sandpiper Lane, Knoxville, TN 37922, 615-966-0172; \$15: First product review from this company appearing in THE RAINBOW)

— T.C. Taulli

Software

CoCo 1, 2 & 3

Inventory Manager — A Program You Can Count On

Being in business myself, I was more than happy to receive a copy of *Inventory Manager* by Forrest Enterprises for my latest review assignment. Nor could the timing have been any better, as the program arrived in time for me to use with my own inventory.

Inventory Manager is just what the title says. It basically handles all the necessary (not to mention dreaded) tasks involved in recording and updating your inventory records. Actually, about the only thing it doesn't do is take inventory for you.

One of the first things I would like to point out is that *Inventory Manager* comes on a non-protected disk, which makes it possible for you to make a backup copy. Another welcome feature

is that the program is written mainly in BASIC, which makes it easy to modify to suit your personal needs.

Modification was necessary in my particular case because I am in the food service business, and the inventory procedure differs a little from that of other types of businesses. I work a lot with weights and fractions, whereas most businesses need only be concerned with the physical count of a particular item. All it took was a phone call to the distributor and my problem was solved.

Upon loading *Inventory Manager* you are greeted with a simple title screen. Pressing any key takes you to the configuration menu, where you tell the program the number of disk drives used, the printer's baud rate, the company name and address, and which version (there are two) of *Inventory Manager* you would like to run. This configuration is a nice feature — systems change. (To save you the time of having to answer these questions every time you load the program, you can use a second boot-up program after configuration. You change the appropriate program lines to match your system, as described in the manual.)

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Once you have configured the program for your system, you are presented with the main menu. From here you are given the option of doing such things as creating a new file or printing out inventory, purchase orders and item lists. Or you can sort, edit and move any number of items within your various files.

The first time you run the program you will naturally have to start by creating a file. You will be prompted for the name of the file to be created and then for all the necessary information to set up your own inventory system (this is where the only real difference between Version 1 and 2 will be of any importance).

The first two things you are prompted for are the identification number (up to four digits) and the item order number

(a code of up to 10 characters that your supplier uses to identify a particular item), such as a part number.

If your particular business does not require an order number, you may want to use Version 2, which handles all its sorting and file management by use of the item I.D. number alone. This saves a lot of unnecessary typing — you can just press ENTER when prompted for information.

Next you will be asked for an item description (up to 40 characters), the inventory quantity (the amount you have on hand) and the "trigger" order quantity. The trigger order quantity is a useful feature that "triggers" automatic ordering of an item when the inventory quantity of an item matches or falls below the specified trigger quantity.

Next you will be prompted for the "after order" quantity. This along with the trigger order number is how the program decides how much of a particular item needs to be ordered when using the auto-order feature. The last two prompts are the item cost (how much a particular item costs you) and the retail cost (how much you plan to charge for the item).

The best part is that if you should make a mistake while entering any of this information, you can update it at a later time. You can even delete the entire record if you decide you no longer want to carry a particular item. Items can be moved from one file to another or converted to allow files created with Version 1 to be used on Version 2, or vice versa. All of this makes *Inventory Manager* a very flexible and full-featured inventory control and purchase order entry system.

After all the items have been entered into inventory files, *Inventory Manager* can complete what to me used to be some very time-consuming tasks. To start with, placing a purchase order is now as simple as just answering a few prompts. For example, I was able to print out a purchase order containing 71 items, with individual prices calculated and totaled at the bottom, including additional charges (postage and handling, etc.), all in just a couple of minutes. This is a welcome improvement to the usual 30 to 45 minutes spent doing the same thing by hand.

With the inventory printout option I was able to get an entire listing of my stock, including unit cost and total cost for each item — not to mention the total value of my entire stock — with just a few keystrokes. I found this to be exactly what I needed to help determine my operating costs and to prepare my inventory/sales reports (which are required by the company I work for), and I could do it in just a few steps taking less than a half-hour. Now that's a lot of power for your dollar, especially if you compare it to expensive programs out there for some of the other machines.

Everything considered, I must say I am very pleased with the performance of *Inventory Manager*. It does everything I would expect of a program of this type, and maybe even a little more. In my opinion, if you own a business and find inventory to be a tedious and time-consuming job, I think buying this product would definitely be money well spent!

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protected disk and will run on any CoCo with at least 64K and one disk drive (although I recommend two drives). Be sure to specify which CoCo you have when you order (1, 2 or 3). A printer is also optional but *highly* recommended if you hope to use the full potential of this program. It comes with a 13-page manual that tells you everything you need to know. If for some reason you do run into a problem, you can call the author, Mike Forrest. I found him to be more than happy to help me, and within two days after the call I had an updated version in my mailbox. Now *that's* service!

(Forrest Enterprises, 6266 Melody Lane, #3074, Dallas, TX 75231, 214-369-5425; \$25: First product review from this company appearing in *THE RAINBOW*)

— Bryan Gridley

of three windows. A second window is used to display the files in the selected directory, and the third window displays the various commands available and serves as a dialog box. From the main menu you can change to another directory or create and delete directories.

Using the up and down arrow keys you can select a subdirectory; by pressing the ENTER key you can display its list of files in Window 2. A submenu appears providing options to view, tag, copy and delete files. A file is selected by moving the up and down arrow keys and pressing the ENTER key to tag it. If you press C the file can be copied; pressing D deletes the file, and F1 allows you to view the file. When you view the file, a pop-up window appears and the file scrolls through the window.

Copying and deleting multiple files is a piece of cake with *DMT*. Simply move the arrow keys to the appropriate files and press ENTER to tag them. Once all the files have been tagged, simply press C or D. When copying, *DMT* prompts for the new directory; when deleting files, *DMT* asks if you are sure all of the tagged files should be deleted. If you agree, *DMT* proceeds to delete them.

DMT is a useful "workhorse" type program for managing the OS-9 disk system. Although I don't have a hard disk system, I can see that such a utility would be quite useful. I found the utility especially useful for rearranging files on floppy disks. Being able to select a number of files to be copied to other floppies really speeds up disk maintenance.

The only problem I found with *DMT*

Software

CoCo 3

Disk Manager Tree — OS-9 File Management

Managing files on a disk with the limited file management utilities provided with OS-9 Level II is not an easy task — especially if you have a hard disk. The simple copy and delete commands do the job... one file at a time. But what if you want to copy or delete a number of files on a disk? Well, you could type the appropriate command over and over again, changing the filename each time, or you could use *Disk Manager Tree* from Alpha Software.

Disk Manager Tree is a file manipulation utility that runs under OS-9 Level II and makes excellent use of the windowing capability built into the operating system. The package is designed to work with standard floppy disk systems, hard disk systems and RAM disks. When you execute *DMT*, it scans the entire disk that is mounted in the specified device, say /d0, and displays the disk structure graphically. For my system disk, *DMT* displayed the following:

```
---/d0
|--CMDS
|--ICONS
--SYS
```

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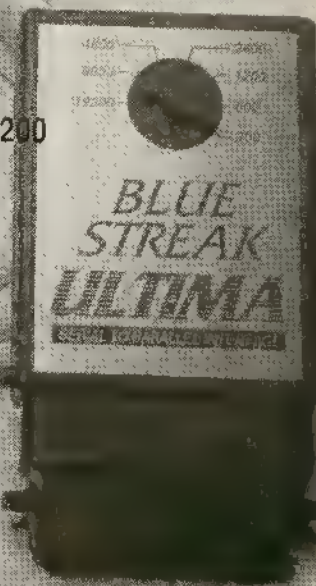
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is in the View File option. Once a text file is selected for viewing, there is no way to terminate the listing other than by scrolling through the entire file. This is, of course, a major concern if you happen to choose a large file to view. I hope that Alpha Software will correct this in the next revision of the program.

I should also mention that *DMT* comes with an icon and instructions on how to include *DMT* in *Multi-View*. And, finally, *DMT* takes up about 70K of memory — which is not a problem on a 512K CoCo but might be for a 128K CoCo.

I strongly recommend *DMT* for new and advanced users to OS-9. It is an efficient and easy way to manage files. The program is very simple to use, has a good manual and an online help capability.

(Alpha Software Technologies, 2810 Buffon St., Chalmette, LA 70043, 504-279-1653; \$29.95)

— Donald Dollberg

venture. Our CoCos are outstanding graphics computers, and this good Adventure could be a great one with graphics.

Shadow World is available on either tape or disk and is not copy-protected, so backup copies for your own protection is not a problem.

(Prodek Software, c/o Mike Snyder, Route 2, Box 81, Allen, OK 74825, 405-857-2852; \$10.50 for tape, \$12.50 for disk: First product review for this company appearing in *THE RAINBOW*.)

— Robert Gray

Software

CoCo 1, 2 & 3

BASIC Screen Editor — Full-Screen Editing Capabilities

I learned BASIC by typing in listings from magazines. I started with plain BASIC, which meant erasing the line and typing it over (really tough on those 255-character packed lines). Then I expanded my CoCo with Extended Color BASIC and, bless Tandy, there was a line editor built-in. Now I could fix those typos with relative ease. Coincidentally, as my experience on the CoCo expanded, I also became a "professional" programmer and had access to a multitude of editors.

Most of these editors I used in my work allowed me to load in whole files to edit a full screen at a time. What a pleasure that was. Then I would come home to CoCo's humble line editor and wish for better things. Well, let me tell you, better things could be here.

BASIC Screen Editor by Douglas Pokorny and Gil Winograd takes the CoCo line editor one step further. It provides a full-screen editor especially for BASIC programs. It allows you to edit anything that appears on the screen — including direct commands.

BSE includes a short formatting program that must be run before using the editor the first time. It initializes and customizes the editor to your current CoCo setup and favorite features. Once you've set everything up, all you have to do is type *DBS* if your CoCo supports that command, else type *RUN"BSE"*. If you ever change your mind or your

CoCo, just run the configuration program to change the initialization parameters.

What does *BSE* do for you? After the title screen, you don't even know it's there. So start typing in that great program you found in *THE RAINBOW* and run it. Oh, no, the dreaded SN Error! List the line in question and use the BASIC line editor to fix your typo. The normal Tandy editing commands are still active. What happened to the *BSE* program? Oh, it's still there, waiting for you to decide that you need a heavy-duty fixer.

List a bunch of lines. Say you want to customize the program with your own name in the *PRINT* statements. Great, just use the arrow keys to put the cursor over the word you want to change and type away. Press the arrow keys to get to the next change and type away again. If you hold down an arrow key for about a second, it starts auto-repeating. Slick, I can travel all over the screen with hardly a thought.

Here is a complete list of all the features of *BSE* and the keystrokes to generate them:

arrow keys	move cursor one character
BREAK	deletes character under the cursor
SHIFT-left arrow	backspaces
F1	recalls custom palette (CoCo 3)
F2	uses default CoCo 3 palette
CLEAR-@	erases screen
CLEAR-up arrow	puts caret on-screen
CLEAR-down arrow	toggles insert mode
CLEAR-left arrow	moves cursor to beginning of line
CLEAR-right arrow	moves cursor to end of line
CLEAR-BREAK	deletes from cursor to end of line
CLEAR-ENTER	splits the line at the cursor
SHIFT-@	toggles <i>BSE</i> on and off

The program is reset-proof, and other features include automatic lowercase-to-uppercase conversion, compatibility with the CoCo 1, 2 and 3, and compatibility with JDOS and ADOS. I'm using it with a 128K CoCo 3. It is written in position-independent machine lan-

Software

CoCo 1, 2 & 3

Shadow World — Adventures in Time

Shadow World is a text-only Adventure written for your 64K ECB Color Computer. It also runs fine on the CoCo 3. In *Shadow World*, your goal as a scientist is to find out why experimental lab animals have been dying as a result of time-travel experiments performed by a company that has stolen your time-travel formula.

This is a difficult Adventure to solve, but it is possible. The author has placed many items and locations in the game that are not necessary for the solution, and the result is a tough yet challenging Adventure.

As with most Adventures, this one also recognizes various abbreviated commands, such as *N* for north and *INV* for inventory. Your progress is best monitored with the use of a map, and provisions are made to save and reload a game using the standard *(C)SAVE* and *(C)LOAD* commands. A perfect score is 10, and I scored 8 — but only with the help of a solution sheet the author sent for the purpose of the review.

The game scenario is interesting and challenging. The only flaw I can see is that *Shadow World* is a text-only Ad-

guage and comes on an unprotected disk.

The manual is eight pages of extremely readable text that fully explains the program's use and operation. It has plenty of examples and is written in fairly plain English so that even an inexperienced user should have no trouble understanding it. There were one or two minor typos, but I'm really fussy about manuals.

BSE performed as described with some minor problems. I couldn't get some of the shifted characters to auto-repeat — strange things got printed on the screen (the distributor says this can't be fixed so they are going to put a notice in the manuals). Another point I am concerned with is that the program allows you to type in more characters on a BASIC line than the CoCo allows; this could present a minor retyping chore if you get carried away packing lines.

But on the other hand, no matter what I did, I couldn't get the program to have a major malfunction. In fact, I found it really neat to be able to re-execute command lines by just moving the cursor back to the beginning of the

line (like a DIR command) and pressing ENTER. Another fun feature is the program's ability to recover programs after a NEW command. As long as it is on the screen, a line can be recovered by simply moving the cursor to the beginning of each line and pressing ENTER. Presto! Recovered code.

I would not call this program a full-featured editor because some features are missing that I would consider essential — like being able to scroll through the whole file and having cut-and-paste capabilities. Nonetheless, it has plenty of useful features that makes the CoCo easier to use. Given the reasonable price and the program's resident state, this looks like a good deal for all you BASIC programmers.

See pg 34, Jul 88 RB for type in pgm for some plus other features.
(Second City Software, P.O. Box 72956, Roselle, IL 60172, 312-653-5610; \$19.95 plus \$2.50 S/H)

— C.L. Pilipauskas

Software

CoCo 3

Al-Write — CoCo 3 Editor/ Assembler

Al-Write is an editor/assembler written just for the CoCo 3. When the package first arrived, I was excited with the idea of a new tool for writing assembly programs that might allow me to retire my old super-patched ED-TASM+, which has been modified to run on the CoCo 3.

Al-Write comes on one unprotected disk with a 57-page manual. The disk may be backed up with the BACKUP command; in fact, this is the only way a working copy can be made because the program makes use of the command DDS for starting the program. Do not just copy the files! Instructions for this should have been included in the manual. Backing up your master disk is always important — but especially so when working with assembly language.

SPECIAL EVENT!

COCO GALLERY LIVE SHOWCASE YOUR BEST AT RAINBOWFEST

We are taking the popular "CoCo Gallery" on the road to RAINBOWfest Princeton — and we'd like you to submit your own graphics creations to be exhibited at the show!

RULES

- You can enter color or black-and-white photographs or printouts of your original artwork produced on the CoCo 1, 2 or 3. Entries must be framed, mounted or matted, and may not be smaller than 5-by-7 inches or larger than 11-by-14 inches.
- Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is *not* an original work.
- Along with your entry, send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.). Please include a few facts about yourself, too!
- Your name, address and phone number, along with the title of your work, must be clearly marked on the back of each entry, and a disk copy of each piece must also be included.
- Entries must be mailed to THE RAINBOW before October 10, 1988, or brought to the RAINBOWfest registration booth by 10 a.m., Saturday, October 22.
- All entries to CoCo Gallery Live become the property of Falsoft, Inc.

There will be two categories: one for graphics produced on the CoCo 1 and 2, and one for CoCo 3 graphics. Several awards will be made in each category. Winners will be determined by votes from RAINBOWfest attendees. In case of any ties, winners will be determined by our chief judge, CoCo Cat.

Prizes and ribbons will be presented Sunday, October 23, 1988, and winning entries will be published in the February '89 issue of THE RAINBOW. Send your entry to "CoCo Gallery Live," THE RAINBOW, 9509 U.S. Highway 42, Prospect, KY 40059.



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OCT. 21-23

RAINBOWfest is the only computer show dedicated exclusively to your Tandy Color Computer.

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RAINBOWfest is a **great opportunity** for commercial programmers to show off new and innovative products for the first time. Princeton is the show to get information on capabilities for the new CoCo 3, along with a terrific selection of the latest CoCo 3 software. In exhibit after exhibit, there will be demonstrations, opportunities to experiment with software and hardware, and special RAINBOWfest prices.

Set your own pace between visiting exhibits and attending the valuable, free seminars on all aspects of your CoCo — from improving BASIC skills to working with the sophisticated OS-9 operating system.

Many people who write for THE RAINBOW — as well as those who are written about — are there to meet you and answer questions. You'll also meet lots of other people who share your interest in the Color Computer. It's a person-to-person event and a tremendous learning experience in a fun and relaxed atmosphere.

A special feature of RAINBOWfest is the **Educational Sandbox**, which features child-oriented workshops to give hands-on experience to an age group often neglected. There are sessions for the kindergarten through third-graders, and for fourth- through sev-

enth-graders. And, as an additional treat for CoCo Kids of all ages, we've invited frisky feline CoCo Cat to join us for the show. RAINBOWfest has something for everyone in the family!

If you missed the fun at our last RAINBOWfest in Chicago, why don't you make plans now to join us in Princeton? For members of the family who don't share your affinity for CoCo, there are many other attractions in the Princeton area.

The Hyatt Regency Princeton offers special rates for RAINBOWfest. The show opens Friday evening with a session from 7 p.m. to 10 p.m. It's a daytime show Saturday — the CoCo Community Breakfast (separate tickets required) is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs until 6 p.m. On Sunday, the exhibit hall opens at 11 a.m. and closes at 3 p.m.

Tickets for RAINBOWfest may be obtained directly from the RAINBOW. We'll also send you a reservation form so you can get a special room rate.

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Overview of BASIC09

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COCO COMMUNITY BREAKFAST

Dick White — RAINBOW Contributing Editor

Our keynote speaker for the traditional CoCo Community Breakfast is Dick White, contributing editor for THE RAINBOW. Mr. White, who has a long background with microcomputers, will discuss his personal experiences in the early years as he traces the development of the Color Computer since its introduction in 1980.

SPECIAL EVENT!

We're pleased to present The Educational Sandbox, a joint Tandy/RAINBOW effort. This is a computer workshop for RAINBOWfest kids. There will be two sessions on both Saturday and Sunday. One workshop will be for the kindergarten through third-grade set, and the other for fourth- through seventh-graders. Each workshop will last between 45 minutes and one hour, and will give the children and their parents hands-on experience in using Tandy computers and software.

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Make checks payable to: The RAINBOW. Mail to: RAINBOWfest, The Falsott Building, 9509 U.S. Highway 42, P.O. Box 386, Prospect, KY 40059. To make reservations by phone, in Kentucky call (502) 228-4492, or outside Kentucky call (800) 847-0309.

Several times while I was running *Al-Write* the disk did a self-destruct.

Al-Write will run only on a CoCo 3 using Disk BASIC 1.1 and one or more disk drives. If you are not sure which version you have, look at the start-up logo when you first turn your computer on. It should read Disk Extended Color BASIC 2.1; if it reads 2.0, you have Disk BASIC 1.0.

First I tried to run the program on my 512K CoCo 3 and was presented with a blank screen and blinking cursor. Since I also have 128K CoCo 3s for the kids, I took command and used them for testing. I had a few problems with *Al-Write*, but a request for help brought a new disk with Version 1.1 and additional information not in the manual. Because almost any new product is likely to have bugs, I expect the manual may be updated by the time you read this. The new 1.1 version also fixed the ghosting bug and works with 512K.

When you type DOS you are presented with the copyright notice; pressing any key will put you in the main menu. From here your first option is Edit, which will put you in a BASIC full-screen editor that can support 32- or 40-column screens. While the 80-column screen is not supported, most programmers should find the 40-column screen satisfactory. The colors used in the display (black, white and green) are compatible with any type of monitor or TV.

While the manual is sizable, I must take exception to some of the terms used and other inaccurate information that it contained. More about using *Al-Write* and some of its excellent features would be a real help. An index would have helped greatly in locating needed information. Very important instructions for using *Al-Write* were missing or hard to find.

From the menu you can view your disk directory in a neat two-column format; load or save your source file; assemble code; run assembled code; quit *Al-Write* or select the Options menu. You must use the Options menu to name your binary/object code disk file. When you load or save your source text file you are prompted for a filename. In the Options menu you can select screen or printer output for your assembly listing.

No method is provided for listing your text file to a printer! The Options menu lets you set a default origin for your assembled program, but it must reside totally in the range of \$6000 to \$7FFF, which is fine for some

applications. You may also use the origin directive in your source code, but only one ORG is allowed.

Another stated limitation is that the assembled program must not "handle" memory outside the \$6000 to \$7FFF range if it is to run within the *Al-Write* environment. This eliminates the ability to access any graphics or text screens, system registers, BASIC hooks in low memory, etc. Some utilities published in THE RAINBOW require access to these memory areas. This also means you cannot take advantage of the extended memory of the CoCo 3 system within *Al-Write*. But programmers *can* write and assemble a program anywhere in memory with *Al-Write*, then load and execute it from BASIC.

SAMPLE.ASM is a text file you can test the assembler with. Several times I was greeted by an unknown system error even with the sample. If you do get this error you must turn your CoCo 3 off and then on to recover, even if it was run from *Al-Write*'s menu. The start label is not supported and is not allowed, but you can use any other valid label name to specify the execution point in your program. To do this you follow the END statement with the label you have chosen; if you fail to do this the program will crash the system when you try to run it. *Al-Write* uses a default execute address of \$000 unless you specify the address directly or with a label in the END statement.

One feature I really like is the ability to write subroutine source code and save it in a disk file — thus you can build yourself a subroutine library. The subroutines may then be added to your main program using the Include function; this can save a lot of typing or reinventing of the wheel, so to speak. The Include feature works very well. While assembling the source code, it loads in and includes (merges) source text from disk files. Includes may not be nested. There's no need to worry about conflicting line numbers because *Al-Write* does not need or use them.

Al-Write follows some predefined conventions for register usage allowing easy parameter passing. Parameter passing is well-explained in the manual, which provided examples. *Al-Write* does allow you to do a trial assembly; the program assembles your text, listing errors found while assembling your source file. *Al-Write* does provide error messages, but it usually overprints the line with the error. Normally when the assembler encounters an error the assembly process is aborted and you are

returned to the editor, but this may be overridden with the NoEdit directive. Other directives include List/NoList, CLS (clear the screen) and Wait, which will stop and wait for a key press before continuing during assembly.

Well, if you are a person who reads only the last paragraph of a review, here is mine in a CoCo-nutshell. While *Al-Write* has some excellent features, its limitations preclude it for many practical uses. If the memory location and access restrictions within the environment could be eliminated, *Al-Write* could set a new standard for assembly language programming under Disk BASIC. *Al-Write* will run on any CoCo 3 with Disk BASIC 1.1. Though the manual was sizable, some very important information was either missing or hard to find. While I had problems at first getting *Al-Write* to work as expected, I received a quick response from the author, a new version with bugs fixed and additional information not in the manual.

(Daniel Jimenez, P.O. Box 4967, San Antonio, TX 78285, 512-690-1788; \$30: First product review from this company appearing in THE RAINBOW)

— J.D. Walker

Software

CoCo 3

Word Power 3.1 — 80 Columns and Windows, Too

After using *VIP Writer* with my CoCo 2 and a composite monitor for several years, I looked forward to viewing an 80-column screen with the CoCo 3. But I was greatly disappointed at the lack of good "friendly" word processing software that followed. I tried two systems advertised in RAINBOW, but they failed to meet my requirements — versatility and the KISS factor (Keep It Simple, Stupid).

So I continued using *VIP* with its 64-column window until Microcom came out with *Word Power 3*. The first version of the system had a few bugs, but it showed great promise. Through close coordination and cooperation with those who recognized this promise, Microcom now offers CoCoists a very useful system that is *fun* and a joy to use.

Before going into a detailed review of this system, I would like to point out that I am impressed with the software development capability of Microcom.

After I received the initial version and noted a few problems, I received their 3.1 version, which took care of these problems and included many other enhancements. I called to express my thanks and was told that they plan to revise the program as necessary to make it more responsive to the needs of the public based on recommendations and to provide previous customers updated versions for cost and handling. This is *real* PR!

One of the most impressive things about this word processor is that it was developed for the CoCo 3 from scratch and, unlike other word processors, is not "patchwork." This makes it more sufficient in fully utilizing the versatile capabilities of the CoCo 3. Written in machine language and operating in the double-speed mode, it has amazing execution speed and enables very fast screen reformatting. Also, *Word Power* 3.1 is not copy-protected, which means you can make copies for your own use.

The system's ease of learning really impressed me. Memorizing the key commands is a snap because most follow a logical pattern, and the system employs an effective use of colorful

windows. It is much easier to use than the *VIP* software and two other CoCo 3 word processing systems I had tried. Even *WordStar*, which I use in my work, is nightmarish in comparison with *Word Power* 3.1.



The first requirement in using *Word Power* is running the program *SETUP*, which establishes your defaults, some of which can be changed while typing and editing.

When you run *SETUP*, the first thing you see is the main menu:

1. Set Colors
2. Set Parameters
3. Set Printer Codes
4. Save Setup File

Word Power 3.1 opens beautiful horizons of colors that you pick out yourself, and you can change them if you tire of a particular set. I have an RGB color monitor, and I use a beautiful sky blue background with black letters when I am in the edit mode, and my linefeed symbols are purple. In the window mode I have a red border with an amber background on the inside. There are many colors and combinations from which to choose. If you have a monochrome monitor, you still go through the color selection routine to get the "mix" that appeals to you.

When selecting parameters you are asked whether you want a key-click, automatic key repeat and automatic saving (which is *great* in my case, because I live in "the lightning capital of the world," which seasonally experiences frequent power disruptions). I set my left and right margins at 1 and 79, respectively, so that I can see as much as possible on the screen without scrolling to the right. But before printing I change the margins to give me a 1-inch border.

After entering your default parameters, you need to enter the various codes

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Reviewed
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pg 141 pg 140

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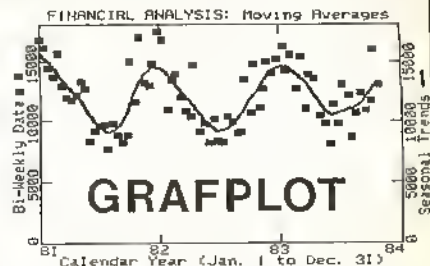
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WORD TESTS
KILLER MANSION
BARTENDER
CALENDAR
ROBOT WAR

ISSUE #2, AUG. 1982

UFO COVER PT. 1
BIORHYTHM
BOMBARDMENT
BLACK JACK
COST OF LIVING
FRENZY
BUSINESS LETTER
QUICK THINK
QUEST INSTRUCTIONS
QUEST FOR LENORE

ISSUE #3, SEPT. 1982

UFO COVER PT. 2
BASKETBALL
CHUCKLUCK
SLOT MACHINE
ALPHABETIZER
NFL PREDICTIONS
ELAG CAPTURE
ROBOT BOMBER

ISSUE #4, OCT. 1982

UFO RESCUE
TANK BATTLE
DRIVEWAY
SOUNDS
BALLOON DROP
MINO BOGGLE
COCO-TERRESTRIAL ADV.
CALORIE COUNTER
JACK-O-LANTERN

ISSUE #5, NOV. 1982

CATALOG COVER
BOWLING
PROGRAM INVENTORY
PROMISSORY-LOANS
CHECKBOOK BALANCER
TRIGONOMETRY TUTOR
CONVOY
BAG-IT
SPECTRA SOUND
CONVEYOR BELT

ISSUE #6, DEC. 1982

CHRISTMAS COVER
RAINOROPS
STOCK MARKET
ADVANCE PONG
DESTROY
SOUND ANALYZER
CREATIVITY TEST
VOICE DATA
ML TUTORIAL PT. 1
LOONY LANCER

ISSUE #7, JAN. 1983

NEW YEARS COVER
LIST ENHANCER
SUPER PRECISION DIV.
BOMB DIFUSE
SPACE STATION
ML TUTORIAL PT. 2
SHOOT OUT
FIND UTILITY
CYBORG INS.
CYBORG FACES

ISSUE #8, FEB., 1983

COVER 8
DEFEND
3 DIMENSIONAL MAZE
COCO CONCENTRATION
AUTO LINE NUMBERING
ML TUTORIAL PT. 3A
ML TUTORIAL PT. 3B
NUCLEAR POWER PLANT
DUAL BARRIER
BRICKS

ISSUE #9, MARCH 1983

TIME MACHINE COVER
TRIG DEMO
PYRAMID OF CHEOPS
PROGRAM PACKER
BUDGET
ELECTRONIC DATE BOOK
ML TUTORIAL PT. 4
TAPE DIRECTORY
BLOCK-STIR
COCO ADDING MACHINE

ISSUE #10, APRIL 1983

TENTH COVER
PYRAMID OF DANGER
TYPING TUTOR
ML TUTORIAL PT. 5
TINYCALC
STOCK MARKET COMP
YAH-HOO
MISSILE ATTACK
SCREEN PRINT
BRIKPONG

ISSUE #11, MAY 1983

ELEVENTH COVER
ARCHERY
FROG JUMP
ML TUTORIAL PT. 6
MLT DICTIONARY
BASIC SPEED UP TOT.
METRIC CONVERTOR
GRAPHIC QUAD ANTENNA
GRAPHICS PROGRAM
CATERPILLAR CAVE

ISSUE #12, JUNE 1983

TWELFTH COVER
SHOOTING GALLERY
BOMB STOPPER
VALLEY BOMBER
STAR FIGHTER
WHEEL OF FORTUNE
ML TUTORIAL PT. 7
MERGE UTILITY
RAM TEST
LANOER

ISSUE #13, JULY 1983

THIRTEENTH COVER
ELASH CARD
ICE BLOCK
COSMIC FORTRESS
MAIL LIST
DOLLARS & CENTS
ML TUTORIAL PT. 8
SOSK COPY
MUSIC SYNTHESIZER
CRAWLER

ISSUE #14, AUG. 1983

MYSTERY COVER
ROW BOAT
COMPUTER TUTL PT. 1
INDEX DATA BASE
DISK ZAPPER
COCO-MONITOR
COCO-ARTIST
ROBOT COMMAND
TEST SCREEN PRINT
HIGH RESOLUTION TEXT

ISSUE #15, SEPT. 1983

MYSTERY COVER PT. 2
GOLO VALUES
TREK INSTRUCTIONS
TREK
HIGH TEXT MODIFICATION
ASTRO ODDGE
OR. COCO
PEG JUMP
MORSE CODE
PURGE UTILITY

ISSUE #16, OCT. 1983

MYSTERY COVER
BOBOTRON
DIRECTORY RECALL
VECTOR GRAPHICS INST.
VECTOR GRAPHICS
SKYOIVER
SWERVE AND DODGE
NIMBO BATTLE
TAPE ANALYSIS UTILITY
LIFE GENERATIONS

ISSUE #17, NOV. 1983

THANKSGIVING COVER
3-D TIC-TAC-TOE
INOY 500
COLLEGE ADVENTURE
MEMORY GAME
DUNGEON MASTER
WEATHER FORECASTER
GRID FACTOR INST.
GRID FACTOR
DRAW

ISSUE #18, DEC. 1983

CHRISTMAS COVER
CLIMBER
GALACTIC CONQUEST
WARLOROS
STATES REVIEW
MATH TUTOR
MACHINE LANGUAGE OATA
PRINTER UTILITY INST.
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MUTANT WAFELAS

ISSUE #19, JAN. 1984

BANNER
PROBE
DISK OIR. PROTECTOR
OPTICAL CONFUSION
WORD PROCESSOR
WORD SEARCH
ASTRONAUT RESCUE
STAR TRAP
PIE CHART
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ISSUE #20, FEB. 1984

INTRODUCTION
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BASIC CONVERSIONS
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SNAKE CRAWLER
WAR CASTLE
SKY FIRE
EASY BASIC
OOTS 3-D

ISSUE #22, APRIL 1984

HEALTH HINTS
GLIBLIPS
CLOTHES SLITHER
BIBLE 1 & 2
BIBLE 3 & 4
CATCH ALL
INVADER
ALIEN RAID
MOON ROVER
IO ERROR IGNORER

ISSUE #23, MAY 1984

MONEY SAVERS 1 & 2
STOCKS OR BOMBS
WALL AROUND
COCO TECHNICAL LOOK PT. 1
NUCLEAR WAR INST.
THERMONUCLEAR WAR
CIRCUIT BREAKER
MOUSE RACES
SUPER SQUEEZE
QATA FALL

ISSUE #24, JUNE 1984

OIR PACK & SORT
BRICK OUT
COCO TECHNICAL LOOK PT. 2
USA SLIDE PUZZLE
51 * 24 SCREEN EDITOR
51 * 24 SCREEN EDITOR
CITY INVADERS
PRINTER SPOILER
STEPS
SNAKE

ISSUE #25, JULY 1984

CLOCK
COCO TECHNICAL LOOK PT. 3
SKID ROW ADVENTURE
MONEY MAKER
PIN-HEAD CLEANING
LINE EDITOR INST.
LINE EDITOR
BOOMERANG
BUBBLE BUSTER
ROCOCHET

ISSUE #26, AUG. 1984

PEEK POKE & EXECUTE
SAUCER RESCUE
YOUNG TYPER TUTOR
O-TEL-O
OLYMPIC EVENTS
DOUBLE DICE
COCO DATABASE
BATTLE STAR
COCO-PIN BALL
MONTEZUMAS DUNGEONS

ISSUE #27, SEPT. 1984

COCO TO COM 64
GALACTIC SMUGGLER
INDY RACE
ACCOUNT MANAGER
CASSETTE MERGE UTILITY
STRING PACKING TUTORIAL
SPACE OUEL
BUGS
TRAP-BALL
BALLOON FIRE

ISSUE #28, OCT. 1984

HANGING TREE
CHECKERS
FOOTBALL
MORE PEEKS & POKES
SPELLING CHECKER
SOUND DEVELOPMENT
WORD GAME
SCREEN REVERSE
AUTO COPY
RAT ATTACK

ISSUE #29, NOV. 1984

DISK ROLL OUT
ROBOT ON
MULTIPONG
ADVENTURE GENERATOR
QUEST ADVENTURE
QUARTER BOUNCE
DUAL OUTPUT
KEY REPEAT
FULL EDITOR
METEOR

ISSUE #30, DEC. 1984

MATH HELP
ZECTOR ADVENTURE
WORLD CONQUEST
ORAG RACE
MINE FIELD
T-NOTES TUTORIAL
T & O PROGRAM INDEXER
SYSTEM STATUS
ERROR TRAP
DROLL ATTACK

ISSUE #31, JAN. 1985

TREASURES OF BARSDOM
BATTLEGROUND
STRUCT. COMPILED LANG.
MINIATURE GOLF
STAR OUEL
ARITHMETIC FOOTBALL
GRID RUN
SPIRAL ATTACK
FAST SORT
MUNCHMAN

ISSUE #32, FEB. 1985

DR. SIGMUND
ICE WORLD ADVENTURE
LOTTERY ANALYST
BASIC COMPILER
MUSIC CREATOR
MEANIE PATROL
TRI-COLOR CARDS
SHAPE RECOGNITION
DISK BACKUP
SPACE PROTECTOR

ISSUE #33, MAR. 1985

LIGHT CYCLE
PAINT
SKEET SHOOTING
GUITAR NOTES
MI DISK ANALYZER
PERSONAL DIRECTORY
NAUGHA ADVENTURE
EGGS GAME
DISK DIRECTORY PRINT
SPEED KEY

ISSUE #34, APRIL 1985

HOVER TANK
POWER SWORD
TERMITE INVASION
SPELLING CHECKER
OOS BOSS
NINE CARD CHOICE
MUSIC GENERATOR
FYR-DRACA
DRIVE TEST
GRAPHIC TOUR

ISSUE #35, MAY 1985

SELECT A GAME 1
TAPE PROBLEMS
STROLL TRIVIA
SOFTBALL MANAGER
FONTS DEMO
CLOWN DUNK MATH
ALPHA MISSION
DOS ENHANCER
KNOCK OUT
HAUNTED HOUSE

ISSUE #36, JUNE 1985

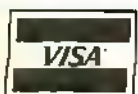
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VIDEO COMPUTER
SPEECH SYNTHESIS
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BIBLE 5-7
SHIP WREK ADVENTURE
FILE TRANSFER
EQUIN A ROW
MARSHY
TAPE CONTROLLER
CATACOMB
AUTO TALK
SGR8PAK

ISSUE #38, AUG. 1985

GOLF PAR3
WIZARD ADVENTURE
KITE DESIGN
ROBOTS
GOMOKU
AMULET OF POWER
LINE COPY UTILITY
DISK PLUMBER
SUPER RAM CHECKER
GRAPHIC HORSE RACE

ISSUE #39, SEPT. 1985

DRUNK DRIVING
CAR MANAGER
SQUEEZE PLAY
SUPER BACKUP
RECIPE MACHINE
ANTI-AIRCRAFT
UNREASON ADVENTURE
TALKING ALPHABET
SUPER VADERS
AUTOMATIC EDITOR

ISSUE #40, OCT. 1985

STAR TREK
HAM RADIO LOG
COCO WAR
DISK LABELER
SHIP WAR
ELECTRIC COST
MULTIKEY BUFFER
NUKE AVENGER
CURSOR KING
SAND ROVER

ISSUE #41, NOV. 1985

GRUMPS
DISK DRIVE SPEED TEST
SOLAR CONQUEST
GAS COST
RIME WORLD MISSION
WUMPUS
CHARACTER EDITOR
GRAPHIC TEST
GRAPHIC LOOPY
BOLD PRINT

ISSUE #42, DEC. 1985

HOME PRODUCT EVALUATION
YAHTZEE
DISK UTILITY
MACH II
ELECTRONIC BILLBOARD
CAR CHASE
SUPER MANSION ADVENTURE
SLOT MACHINE GIVE AWAY
TEXT BUEFER
TUNNEL RUN

ISSUE #43, JAN. 1986

DUELING CANNONS
WATER COST
ZIGMA EXPERIMENT
MUSICAL CHORDS
SAFE PASSAGE
PASSWORD SCRAMBLER
GUNBIGHT
KEYPAD ENTRY
STYX GAME
PRINTER OVERT

ISSUE #44, FEB. 1986

HOME INVENTORY
NINE BALL
PRINTER REVIEW
EXPLORER ADVENTURE
SPANISH LESSONS
CROSS FIRE
RAM SAVER
GRAY LADY
JOYSTICK INPUT
COSMIC SWEEPER

ISSUE #45, MAR. 1986

INCOME PROPERTY MGMT.
ELECTRONIC BILLBOARD 2
MOUNTAIN BATTLE
THE FIGHT
COCO KEENO
HOCKEY
LOGICAL PATTERNS
ON SCALE SCREEN
LIBERTY SHIP
SINGLE STEP RUN

ISSUE #46, APRIL 1986

SPECIAL EVENTS REMINDER
DISK LOCK
SMALL BUSINESS MANAGER
BOMB RUN
TANKS
TAR PITS
BASEBALL
NUMBER RELATIONSHIPS
ROULETTE
GLOBAL EDITOR

ISSUE #47, MAY 1986

CHRISTMAS LIST
BLACK HOLE
PITCHING MANAGER
SYMBOLIC DIFF.
BUG SPRAY
OWARE CAPTURE
EASY GRAPHICS
DESERT JOURNEY
SCREEN CONTROL
FULL ERROR MESSAGE

ISSUE #48, JUNE 1986

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ISSUE #49, JULY 1986

COMPUTER I.O.U.
DISK DISASSEMBLER
BAKCHCK
PACHINKO
STOCK CHARTING
HAUNTED STAIRCASE
CANYON BOMBERS
DRAGONS 1 & 2
GRAPHIC SCROLL ROUTINE
AUTO BORDER

ISSUE #50, AUG. 1986

BUSINESS INVENTORY
O & D ARENA
DISK CLERK
PC SURVEY
TREASURE HUNT
SCREEN GENERATOR
ASTRO SMASH
NEL SCORES
BARN STORMING
SMASH GAME

ISSUE #51, SEPT. 1986

ASSET MANAGER
MONEY CHASE
FISHING CONTEST
RIP OFF
HAND OFF
BUDGET 51
VAN GAR
DOS EMULATOR
MEM DISK
VARIABLE REFERENCE

ISSUE #52, OCT. 1986

ACCOUNTS RECEIVABLE
WORKMATE SERIES
CALENDAR
INVASION
THE TRIP ADVENTURE
FOOT RACE
FLIPPY THE SEAL
SCREEN CALCULATOR
ABLE BUILDERS
SUPER ERROR2

ISSUE #53, NOV. 1986

CORE KILL
LUCKY MONEY
COOKIES ADVENTURE
NICE LIST
SPANISH QUIZZES
PAINT EDITOR
CARVERN CRUISER
SNAP SHOT
MEGA RACE
KICK GUY

ISSUE #54, DEC. 1986

JOB LOG
PEGS
DIGITAL SAMPLING
JUNGLE ADVENTURE
PAINT COCO 3
CONVERT 3
COMPUTER TYPE
PANZER TANKS
MRS PAC
BIG NUM

ISSUE #55, JAN. 1987

GRADE BOOK
MAIL LIST
DOWN HILL
FIRE FOX
JETS CONTROL
GALLOWES
DIR MANAGER
FIRE RUNNER
GRAPHICS BORDER
COSMIC RAYS

ISSUE #56, FEB. 1987

CALENDAR PRINT
CRUSH
GALACTA
OCEAN DIVER
CLUE SUSPECT
WORD EDITOR
ALIEN HUNT
DEMON'S CASTLE
PICTURE DRAW
DIG

ISSUE #57, MAR. 1987

THE BAKERY
EXCHANGED VALLEY ADV.
SAFE KEEPER
WAR 1
BOMB OISABLE
PIANO PLAYER
SPREAD SHEET
SLOT MANEUVER
LIVING MAZE
GEM SEARCH

ISSUE #58, APRIL 1987

ACCOUNTS PAYABLE
PRINTER GRAPHICS
SIMON
PANELING HELPER
MULTI CAKES
CAR RACE
ELECTRONICS 1
BATTLE TANK
DISKETTE VERIFY
WEIRDO

ISSUE #59, MAY 1987

GENEALOGY
HOME PLANT SELECTION
CHECK WRITER
HELIRESCUE
KABOOM
NEW PONG
CROQUET
EUNCTION KEYS
ZOOM
ELECTRONICS 2

ISSUE #60, JUNE 1987

JOB COSTING
LABELS
CATCH A CAKE
COCO MATCH
ROBOTS
STREET RACERS
BOWLING 3
ELECTRONICS 3
GRAEX
KRON

ISSUE #61, JULY 1987

EZ ORDER
SUBMISSION WRITER
KEYS ADVENTURE
WALLPAPER
CHOPPER COMMAND
UNDERSTANDING OPPOSITES
BIT CODE PLOTTING
ELECTRONICS 4
KING PEDE
RAIDER

ISSUE #62, AUG. 1987

PENSION MANAGEMENT
HERB GROWING
CATOLOGER UTILITY
RAIDERS
ALPHABETIZING
U.F.O.
ELECTRONICS 5
RAMBO ADVENTURE
BLOCKS
MULTI SCREEN CAVES

ISSUE #63, SEPT. 1987

GENEALOGIST HELPER
SMART COPY
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COCO3-COCO 2 HELPER
DIRECTORY PICTURE
SUB ATTACK
SAVE THE MAIDEN
CAVIATOR
ELECTRONICS 6
MONKEY SHINE

ISSUE #64, OCT. 1987

GARDEN PLANTS
FORT KNOX
ELECTRONICS FORMULAS
SNAKE IN THE GRASS
CYCLE JUMP
GEOMETRY TUTOR
WIZARD
GAME OF LIFE
ELECTRONICS 7
FLIGHT SIMULATOR

ISSUE #65, NOV. 1987

TAXMAN
DAISY WHEEL PICTURES
CHILDSTONE ADVENTURE
SIR EGGBERT
CROWN QUEST
GYM KHANA
COCO 3 CRAWLER
FOOTBALL
ELECTRONICS 8
CHOP

ISSUE #66, DEC. 1987

ONE ROOM ADVENTURE
OS9 TUTORIAL
RIVER CAPTAIN
SOUND EFFECTS
BETTING POOL
ADVANCE
MATH TABLES
ELECTRONICS 9
LOWER TO UPPER
NOIDS

ISSUE #67, JAN. 1988

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WORD COUNTER
BACARAT
BATTLE SHIP
ELECTRONICS 10
TAPE CONVENIENCE
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ISSUE #68, FEB. 1988

COINFILE
WORD COUNTER
SQUIRREL ADVENTURE
AREA CODES
DRAW POKER
TURTLE RACES
ELECTRONICS 11
MULTI SCREEN
CANON PRINT
COCO TENNIS

ISSUE #69, MAR. 1988

POLICE CADET
STAMP COLLECTION
BARRACKS ADVENTURE
CITY/TIME
HI-LO/CRAPS
OLYMPICS
HI-RES CHES
ELECTRONICS 12
DOUBLE EDITOR
DOUBLE BREAKOUT

ISSUE #70, APRIL 1988

BLOTTO DICE
SUPER COM
GENESIS ADVENTURE
PLANETS
PHK/WAR
SIGN LANGUAGE
ARX SHOOTOUT
ELECTRONICS 13
MAGIC KEY
SNAP PRINT

ISSUE #71, MAY 1988

SUPER LOTTO
ROBOT ADVENTURE
MAZE
YAHTZEE 3
PHASER
SHAPES & PLATES
STAR WARS
ELECTRONICS 14
PRINTER CONTROL
MAZE 2

ISSUE #72, JUNE 1988

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5	13	21	29	37	45	53	61	69
6	14	22	30	38	46	54	62	70
7	15	23	31	39	47	55	63	71
8	16	24	32	40	48	56	64	72

**PLEASE CIRCLE
TAPE or DISK**

for your printer to underline and print in bold, script or italics, etc. There are provisions to handle all your printing needs.

When you have finished entering your printer codes, you save your setup, write-protect your backup disk, cold-start your computer and run **BOOT**. You then see the main menu inside a colored window border on the background color you selected:

Type/Edit
Options
Load File
Save File
Print
Exit to DOS

If you wanted to load a file, you would select Load File using the arrow keys. You would then see an instruction window and the directory of your file disk within another colorful window. These helpful windows and the logical use of the control and other function keys make *Word Power* 3.1 very user-friendly.

In the Type/Edit mode, you create or edit documents. At the top of the 80-column screen display is shown the percentage of memory used and the current column, line and page number; it also indicates whether type is in the upper- or lowercase mode and insert or overstrike mode. Another nice feature is the page-break display, which enables you to see exactly where the page ends; this improves the aesthetic appeal of your documents.

The type-ahead feature lets you type as fast as you want — without losing text. It is very easy to center or right-justify text, as well as to underline text or use boldface, italics, super- and subscripts. Underlining is displayed

onscreen, and the bold/italicized/etc. text is displayed in different colors. I find this preferable to inserting printer codes within the text that throw off line lengths and page-break locations, and which require much more memorizing.

The Locate/Replace feature lets you find a phrase and replace it with another. I especially like the wild card feature that lets you search similarly spelled words with a single reference.

An instant display of all the commands is available in the help screen, which can be accessed with **CTRL-?**. The word count feature is great for students. It instantly displays the total number of words in the entire text, regardless of the cursor position.

Another feature is option code embedding, which enables you to change margins, spacing, etc., in a portion of text (for example, a single-spaced quote in double-spaced text). *Word Power* 3.1 has logical embedded codes (for example, LM for left margin, LS for line spacing, etc.). These codes are listed in the help screen.

Word Power 3.1 has a very user-friendly disk input/output menu. The directory, which shows the remaining granules on the disk, is displayed on the left side of the screen. You can select files by simply cursoring through this window and pressing **CLEAR**; or you may enter your own filename. If you have text in memory and load another file, it will be appended to the text in memory. All saving and loading is done in ASCII format, making *Word Power* 3.1 compatible with most other word processors, spelling checkers and text formatting utilities.

Of all the word processors I have used, *Word Power* has the maximum text storage capacity. On a 512K CoCo 3, it gives you over 460K of text space,

which is roughly 336 pages of double-spaced text. On a 128K CoCo, the storage capacity is more than 72K.

In the printing mode, you select parameters such as baud rate, line spacing, page numbering, right justification, number of copies, headers, footers, etc. The single-sheet pause feature lets me use single sheets instead of perforated paper. The WYSIWYG (What You See Is What You Get) feature is excellent! If you elect *not* to print to the printer, you can view the document onscreen as it will appear after printing. Also, *Word Power* is "printer independent"; that is, it is compatible with almost any printer.

With the mail merge feature, you can type a letter, follow it with a list of addresses and print out personalized letters. This is a useful feature for clubs, schools and other organizations that send bulk mail.

The program comes with a spelling checker/dictionary program on a separate disk. It will work with any ASCII file. I find it very handy to proofread my text for spelling errors. It shows how the incorrect word appears in the text and lists possible correct spellings. At this point I have the option to ignore or substitute the correct word. I also have an option to add words for a "personalized" dictionary.

A nifty little punctuation-checking program included on the *Word Power* disk will check the text for punctuation errors such as capitalization, words appearing twice in a row, spacing and more. Note that the program will not correct errors, but mark them. The user can then choose to go back into the file and correct the errors. I am not aware of any similar program for the CoCo.

The package comes with a 40-page manual and a command reference card.

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Ordering information: send check or money order. Sorry, no credit cards. COD is ok. Shipping and handling included in price. CA residents add 6% tax.

The manual is well-written and guides you step-by-step through the various features.

There is no capability lacking in *Word Power 3.1* that would preclude its ranking with the highest among word processors, and future enhancements promise to make it a system not to be without. Couple the great text features of *Word Power 3.1* with the vivid, beautiful colors, and you *really* have "something to write home about!"

(Microcom Software, 2900 Monroe Ave., Rochester, NY 14618, 800-654-5244; \$79.95)

— Thomas Poor

Software

CoCo 1, 2 & 3

HELLO/BAS — Menu Greetings

I'll admit it: I am not a one-computer woman. Though the CoCo is nearest and dearest to my heart, I dabble with MS-DOS machines (in my work) and have been know to dally with Commodores. But don't judge me too harshly — I always come back to the CoCo, the friendliest and most versatile computer around.

Sometimes, though, I can't help but compare features and inwardly compose a wish list. One thing I wish is that IBM compatibles had a disk operating system built in, like CoCo's Disk BASIC (some Tandy IBM compatibles *do* have MS-DOS built in). It takes IBM machines and their look-alikes so *long* to boot. In comparison, CoCo springs awake, ready to go.

One thing MS-DOS *can* do is auto-

matically execute an AUTOEXEC.BAT file, which can carry out instructions and load specific files for you. With my MS-DOS machine, all I have to do is turn it on — by following the AUTOEXEC.BAT file I wrote, it calls up a menu program that lets me boot (with just one keystroke!) any program on my hard disk. If there's one thing I'm bonkers about, it's menus. And since I'm compiling a wish list, I wish CoCo had an AUTOEXEC.BAT function that could give me a menu of programs on my floppy disk for "point-and-shoot" loading. (Tony DiStefano's projects look interesting, but I am not a hardware person.)

Now, you're probably wondering why I've wasted three paragraphs of what is *supposed* to be a review, spouting off in left field. There's a reason for this: menus.

HELLO/BAS gives 32K ECB CoCos menus. With the program's little auto-repeating cursor, I can zip around an alphabetized menu presentation of a floppy disk directory, press ENTER when I come to a BASIC program I want to load and — bingo — it loads and runs. Just as nifty as my MS-DOS menu.

And what's more, a utility provided allows me to boot *HELLO/BAS* from a floppy by entering the DDS command (this works a lot faster than waiting for MS-DOS's AUTOEXEC.BAT file to finish executing — *HELLO/BAS* does use the high-speed poke). Typing a three-letter command is better than typing the 10-character command, RUN"HELLO".

What's the big deal in saving seven keystrokes? Well, computers *are* supposed to save time — why did you ditch your typewriter in favor of a word processor, anyway? Another reason for using menus is ease of operation. Menus let you set up a sort of "turnkey" system.

New users may stare blankly at you when you try to describe the process of calling up a directory, then loading and running a program, but even a child can quickly figure out how to "point and shoot."

The *HELLO/BAS* disk comes with five files: HELLO, DDS BOOT, HELP, DISK INIT and LOG BOOK. *HELLO*, of course, is the main program. When you run *HELLO*, the program will read the disk directory, alphabetize and display it. The program can be configured to run on any drive. The screen can show 24 files at a time, but there are extra "pages" that can take care of the 25th file and beyond.

In addition to the alphabetized directory display, the screen also shows you the default drive number, which screen "page" you are currently in, the number of files on the disk and the number of granules free. You select and load a program by moving a cursor to the file (via any arrow key) and pressing ENTER. The auto-repeating "cursor wrap" feature is nice — pressing the down arrow key at File 24 takes you back to the top of the directory list. The program does *not* induce finger sweat. Pressing P allows you to print out a hard copy of the directory; pressing CLEAR lets you read another disk in the current default drive.

DISKINIT creates "autobootable" *HELLO/BAS* disks. It is best to run DISKINIT on newly formatted disks, because the DDS BOOT program it generates is sector-dependent; on a semi-full disk there may already be programs occupying the intended sector. This means that you will probably have to create your own *HELLO/BAS* bootable disks from scratch (a bootable disk must contain DDS BOOT and HELLO — HELP is helpful, but not necessary) and

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Reviewed in RAINBOW, February 1988.

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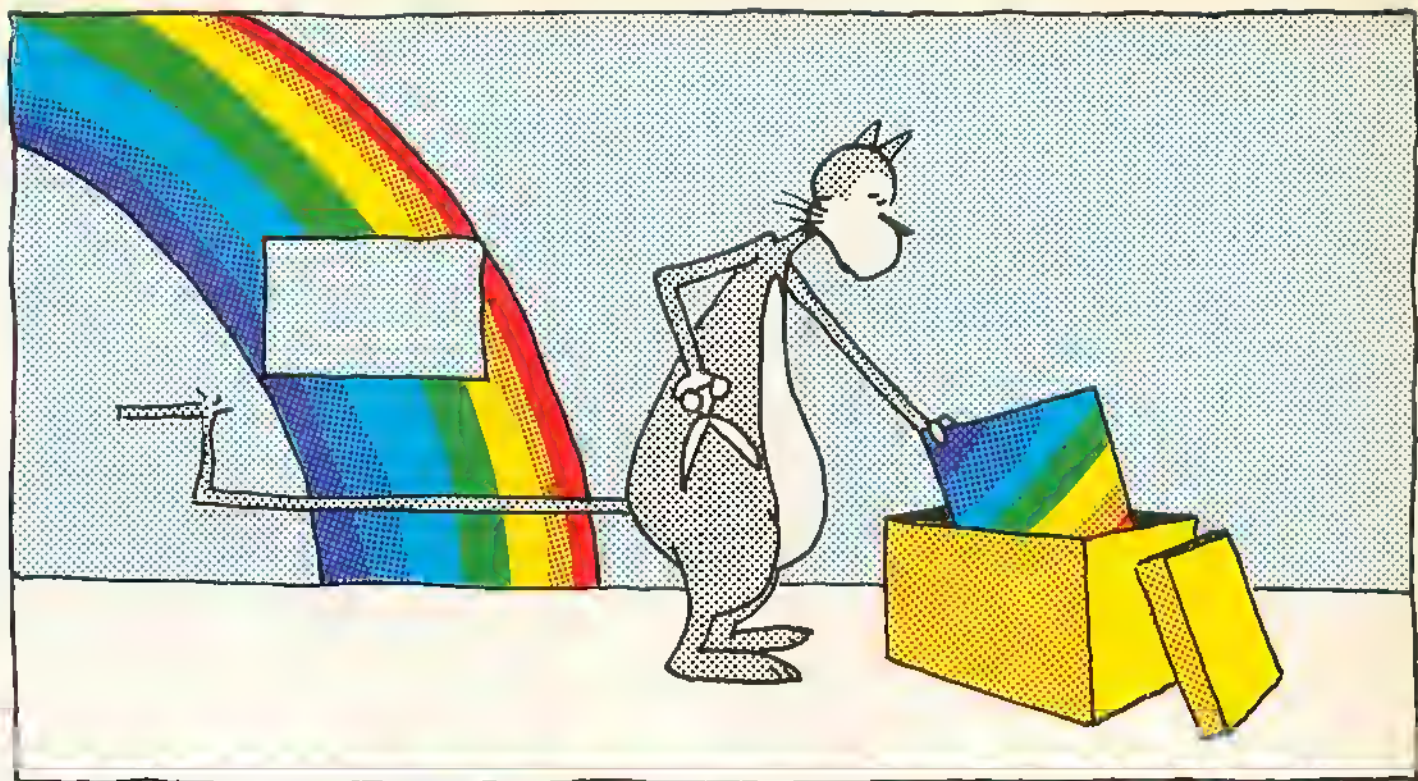
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copy your favorite BASIC programs to the disk. DOS BOOT and HELLO take up one *gran* each of disk space, and HELP takes up two.

HELLO/BAS will not load machine language programs, which is a downer. The author apologizes for this lack on one "page" of the nine-page help file.

HELLO/BAS is one professional-looking, well-behaved (as long as you stay away from ML) and user-friendly utility for BASIC programs. Once you start using it, you may find yourself growing spoiled. I like HELLO/BAS and have put it on the same disk with some of my favorite RAINBOW programs.

The applications are varied. Whether you're a new CoCoist or an old pro, you'll find a use for HELLO/BAS. Seasoned hackers can see whole alphabetized directories at a time (without the SHIFT-@ shuffle), along with other information. New users can circumvent syntax errors. And it would be especially useful for handicapped people and children. Do your fingers a favor and introduce the CoCo in your life to HELLO/BAS.

(RCPierce Software, P.O. Box 1787, Main Post Office, Edmonton, Alta., Canada T5J-2P2, 403-474-8435; \$19.95 US, \$22.95 CDN: First product review from this company appearing in THE RAINBOW)

— Carol Hartman

Software

CoCo 1 & 2

Quest for the Ring — The Vanished Kingdom

You say you've solved *Labyrinth* and have already congratulated yourself for a job well done? Not so fast, King William. Zarth, the evil wizard, found out you were escaping and did some fast work before he was destroyed. He hid your crown, locked your castle and made all the people in your kingdom vanish. Then he hid the ring he used to cast all those spells. Now you have to find the ring so you can undo all the spells and get your people back.

You start this graphics Adventure in front of your castle. From there you can wander around the kingdom, looking for your crown and Zarth's ring. The kingdom contains mountains, streams, chasms and a lake, but no people to ask for help. (I happen to think the piranha fish ate them, but the author says Zarth made them disappear!) You're on your

own, but you can use any objects you find and the clues they provide. The only living thing you'll ever see is the dragon, and he's not about to help you, believe me!

The first thing that struck me when I loaded the game was the excellent graphics. (If you don't have a color monitor, borrow somebody's. The graphics are *much* better in color.) Every time I went to a different screen I sat there for a minute just soaking up the scenery. The second thing I noticed was the sound. A little song plays during the title and "RIP" screens. A note sounds at every keystroke, and a little bird chirps when it's your turn to input.

After I died the first time (on my second move!), I discovered the self-booting feature. By just pressing the CLEAR key you can start the game over without reloading. Those of us who die often really appreciate this; I've seen this feature only in programs written in machine language.

I thoroughly enjoyed this Adventure. The graphics and the logic used are a definite plus. Games that have you do illogical things (i.e., go through mirrors) leave me frustrated. In duplicate scenes (like fields), the trees, rocks and chasms are shown in different places, so it's easy to know where you are. *Quest for the Ring* has a limited vocabulary, but I found that more of a help than a hindrance. Everything I needed to do could be accomplished with a dozen commands. And speaking of help, I got all the help I needed when I looked at objects.

I also got all the help I needed from my 10- and 11-year-old sons (and half the neighborhood children). I'd start playing the game and the next thing I knew there'd be three or four chairs pulled up around me, with the occupants offering advice on what to do next. If I left my chair for a cup of coffee, I'd come back to find it occupied by one of the kids, who'd look excitedly at me and say, "I'll take over from here."

Quest for the Ring is a fun game, simple yet challenging. You have to reason things out, but it isn't so complicated that it will take you months of playing to solve. The kingdom is laid out very neatly, and what you have to do is straightforward. Also, you can carry as much as you want. Your hands never seem to get full. This eliminates the decision of what to drop in order to pick up something else. Decisions like those in other games cause a lot of backtracking and frustration for novice Adventurers.

There is no save feature, so you lose everything you've collected whenever you die. However, starting the game over and recollecting everything is fairly easy if you draw a map as you go along. You score points for every object you find, with a possible score of 504 at the end of the game. Don't let the number 504 scare you, though — there aren't 504 objects in the game. Some things you pick up are worth 30 points, others maybe 50. To see what you are carrying, you have to type USE INV instead of just INV.



Like its predecessor, *Quest for the Ring* is also a stand-alone Adventure for the CoCo 1 or 2, with 64K disk Extended Color BASIC. Note that it will not work on CoCo 1s earlier than an F board. This two-disk set has 59 Hi-Res screens and can run on either a one or two-drive system. The optional high-speed poke is also available. The disks aren't copy-protected, so workable backups can be made, but only with the BACKUP command. Files cannot be copied one at a time. This protection, the only one the authors put in, prevents the loading and running of any of the single "modules" of the game.

RTB guarantees all its software to load, or you can return it for a prompt replacement at no cost to you. I can personally vouch for this service, because my original review copy didn't load. When I called the company, I expected to hear an answering machine at the other end (it was late Saturday afternoon). What I got was a real person. He was very helpful and supportive, and once he realized he couldn't solve my problem over the phone he sent out a replacement copy immediately.

All in all, I think RTB Software has a real winner here. *Quest for the Ring* is a game that can be played and enjoyed by all ages and skills, and is well worth the price. I'd recommend completing the trilogy with *Labyrinth* and *Adventure in Lumeria*, and watching for other

games from this company, which seems to be getting better with each program.

(RTB Software, P.O. Box 777, West Acton, MA 01720, 508-263-0563; \$34.95 plus \$3 S/H)

— Gail Allore

Software

CoCo 1, 2 & 3

Home Bingo — CoCo Calls the Numbers

Home Bingo is a handy program to have around the house if you like to play this popular game with your family. It's also suited to the commercial bingo halls, although one might have a tough time convincing hard-core bingo patrons that a computer is selecting the numbers randomly. I suppose that being able to see and hear those rattling ping-pong balls provides an added sense of honesty and randomness to the typical bingo player.

Home Bingo is supplied on either disk or cassette and is written in BASIC. It requires a minimum of 32K RAM and Extended Color BASIC, and it works fine on the CoCo 3, as well. The program loads simply by entering RUN "BINGO". A short menu of options is displayed. Both regular bingo games and round robin games are supported.



In regular games, the computer first displays the number sequence, such as No. 3, followed by the actual bingo number being called. Numbers such as G58 are extremely large and take up most of the screen.

If the round robin selection is made, the sequence is not counted but the

displayed bingo numbers are just as large as in the regular games. The program keeps track of the numbers it calls so that the same number is never duplicated in a game.

All 75 bingo numbers are available in the program and all are displayed in large green characters on a black background with the prefix, such as 'B', being only about half the size of the actual number. This is helpful in that it tends not to distract from the importance of the number itself. Most professional bingo players don't even need to see or hear the prefix. They have played enough games to know that "58" belongs in the 'G' column.

Home Bingo is a good program at a fair price and provides the CoCo user with a way to bring a little more high-tech into those smoke-filled bingo halls across America.

(Williams Enterprises, 53 Old Derry Road, Box 7, Hudson, NH 03051, 603-883-2859; Cassette \$9.95 or Disk \$11.95, plus \$2 S/H: First product review from this company appearing in THE RAINBOW)

— Jerry Semones

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MLBASIC not only contains everything that you would expect a BASIC programming language should contain, MLBASIC has features that offer flexibility of other languages like C, Pascal, FORTRAN and even assembly language. These features will allow programmers to directly access the CPU registers on the COCO, produce modular program code with SUBROUTINES, manipulate memory in blocks, and even call ROM routines in other areas of memory.

MLBASIC revision 2.0 has incorporated all enhancements that were suggested by MLBASIC 1.0 users and more. Revision 2.0 did away with all the incompatibility problems that existed with revision 1.0.

MLBASIC allows for the first time user to quickly compile a program using default compiler settings. The advanced user has the capability of controlling over a dozen settings which control where the program is compiled, which medium to compile to (memory or disk), string space, compiler listings and more.

With all this going for MLBASIC, your might expect the cost to be a little out of your budget. After looking at prices of other BASIC compilers for the COCO 3 you might be correct. But look again at this ad; for only \$59.95, you can have a programming language that will spark your interest once again in the COCO.

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The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, your assurance that we have seen the product and have ascertained that it is what it purports to be.

Bug Buster, an upgraded arcade game that has you chasing specimens of the species *Bugus computerian* out of the disk drive, ROM, RAM, power supply and the printer. (The bugs infested your CoCo "a long time ago, while you were looking the other way.") This upgrade to *Bug Buster* features faster action and smaller targets. Requires a 32K CoCo, a disk drive and a joystick. *Tothian Software, Box 663, Rimersburg, PA 16248; \$19.95.*

CMM, a stock market trading program "that will make money on a particular stock, whether the stock increases or decreases in price, providing the stock returns to its original price." For the CoCo 1, 2 and 3. Requires a disk drive and a DMP printer. *Weller Enterprises, P.O. Box 8004, La Crescenta, CA 91214, (818) 352-6811; \$49.95.*

Good Games Trio, a collection of 3 two-player games: *ADI, Othello* and *Connect Five*. *ADI* is a computerized version of a "board" game invented hundreds of years ago in Africa. *Othello* uses an 8-by-8 board and permits the user to obtain printouts of current games. *Connect Five* is based on the pencil-and-paper game and is mapped out in 10 columns. For the CoCo 1, 2 and 3; uses the high-speed poke. *RC Pierce Software, P.O. Box 1787, Main Post Office, Edmonton, AB, Canada T5J 2P2, (403) 474-8435; \$19.95 US, \$22.95 CDN.*

Hall of the King Trilogy, a trio consisting of *Hall of the King, Hall of the King II: The Inner Chamber* and *Hall of the King III: The Earthstone Revealed*. Each graphics Adventure takes place in Firrhest, where a dwarven race once lived, and where the powerful Earthstone is hidden. Each program comes on a floppy — two sides of the disk are used. Requirements include 64K and a disk drive. For the CoCo 1, 2 and 3. *Sundog Systems, 21 Edinburg Drive, Pittsburgh, PA 15235, (412) 372-5674; \$74.95 for set, \$29.95 each, plus \$2.50 S/H.*

Hard Bodies, an on-disk swimsuit issue — "page after page of models in swimsuits that will make your CoCo screen sizzle." For the CoCo 1, 2 and 3; requires 64K disk. *Baron Products, 3937 Shady Hill, Dallas, TX 75229, (214) 350-3900; \$15.*

HELLO/BAS, a directory utility that lets you list and print a disk directory in alphabetical order, swap default drives with a key press and

load and run BASIC programs from a menu. For the CoCo 1, 2 and 3. Requires 32K ECB and uses the high-speed poke. *RC Pierce Software, P.O. Box 1787, Main Post Office, Edmonton, AB, Canada T5J 2P2, (403) 474-8435; \$19.95 US, \$22.95 CDN.*

In Quest of the Star Lord Hint Sheet, a listing of the commands necessary to solve *Sundog Systems' CoCo 3 In Quest of the Star Lord Adventure*. The commands are encoded (but you have the key) in order that you don't learn more than you wanted to by a careless glance. The hint sheet is intended to be sold only to registered owners of *In Quest of the Star Lord*. *Sundog Systems, 21 Edinburg Drive, Pittsburgh, PA 15235, (412) 372-5674; \$3.95.*

Moneyman II, a menu-driven program composed of seven modules designed to perform common financial calculations: Savings Planner, Loan Planner, Budget Planner, Checking Account, Savings Account, Reconcile Bank Statement and Summarize Deductibles. The modules interact and call on each other as needed. Requires 32K ECB and a disk drive. An additional drive is optional, and a printer is recommended. *Tothian Software, Box 663, Rimersburg, PA 16248; \$24.95.*

Night of the Living Dead, a text Adventure with a ghoulish turn: You are lost in a remote area, and the dead are waking up. The only goal is to survive. As an incentive, the company is offering \$500 to the first player whose character can live through it (deadline December 31, 1988). For the

CoCo 1, 2 and 3. Requires 64K and a disk drive. *Adventure Novel Software, P.O. Box 8176, Spartanburg, SC 29305, (803) 578-7421; \$34.95 introductory offer.*

VIP Database III, a CoCo 3 database that supports 40-, 64- and 80-column screens, uses separate text and highlight colors for easy data entry, features in-memory sort of all records and a built-in print spooler. The database can store up to 550 records of 256 characters on a one-disk system, and it supports multi-criteria searches with up to 16 separate relational keys. Requires the CoCo 3. *SD Enterprises, P.O. Box 1233, Gresham, OR 97030, (503) 663-2865; \$69.95.*

Wildcard Copy, a Disk BASIC supplement that lets you do a multiple copy with one command, equivalent to the COPY * command on other systems. It can be used to copy files with the same name but different extensions and files that share an extension. The program is written in BASIC for two disk drives and the CoCo 1, 2 and 3. *RVC Software, P.O. Box 560, Englishtown, NJ 07726, (201) 446-2033; \$15.*

Word Processing: TRS-80 & Star NX-10, a word processing program written in BASIC for the duo of the CoCo and the Star Micronics NX-10 dot matrix printer. The program takes advantage of the printer's capabilities, including underlining, italics, NLQ print, emphasized and bold print, superscripts and subscripts, Pica and Elite, etc. For 64K CoCo 1, 2 and 3; comes on cassette only. *Lee Sullivan, P.O. Box 8718, Penacook, NH 03303, (603) 753-4497; \$12.*

First product received from this company

The Seal of Certification program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a Seal, the magazine certifies the product does exist — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

— Lauren Willoughby

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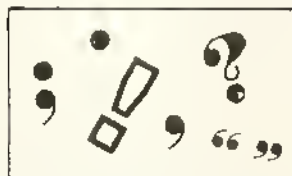


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Barden's Buffer

Assembly Language for the Complete Novice: Part II

By William Barden, Jr.
Rainbow Contributing Editor

Last month's column looked at the basic architecture of the 6809 microprocessor used in the Color Computers, and many of the instructions and addressing modes of the 6809. In this column, I'll write some simple programs, assemble them by hand and by assembler and incorporate them in BASIC programs. This column will present the basic ideas of assembly language programming. Let's see if you're brave enough to learn it.

Hand Assembling

A *sort* usually arranges items in alphabetical order, generally from A to Z. Therefore, if we want to sort all the characters on a text screen in order, we would use a sort — probably a *bubble sort*.

A Bubble Sort

A bubble sort compares the first entry in a list with the next one. If that entry is smaller, swap the entries. The bubble sort continues, one entry at a time, until it reaches the end of the list. If any entries are switched, the process repeats. When no swap has been switched, the list is sorted. Look at the following example:

*F	F	F	F	F	F	F
G	*G	A	A	A	A	A
A	A	*G	B	B	B	B
B	B	B	*G	G	G	G
Y	Y	Y	Y	*Y	C	C
C	C	C	C	C	*Y	D
D	D	D	D	D	D	*Y

(one pass over)

*A	A	A	A	A	A	A
F	*B	B	B	B	B	B
B	F	*F	F	F	F	F
G	G	G	*C	C	C	C
C	C	C	G	*D	D	D
D	D	D	D	G	*G	G
Y	Y	Y	Y	Y	Y	*Y

(two passes over)

*A	A	A	A	A	A	A
B	*B	B	B	B	B	B
F	F	*C	C	C	C	C
C	C	F	*D	D	D	D
D	D	D	F	*F	F	F
G	G	G	G	G	*G	G
Y	Y	Y	Y	Y	Y	*Y

(three passes over, sorted)

In the preceding example, the asterisk shows the suspect item. While the list is sorted after three passes, another pass must be made to verify that no switch has occurred.

The text screen starts at location \$400 in CoCo memory and goes to \$5FF, 512 characters. Here is a BASIC program that would complete this sort:

```
100 Y = 0
110 FOR X = &H400 TO &H5FE
120   A = PEEK( X )
130   IF A <= PEEK( X + 1 ) THEN GOTO 1701
140   B = PEEK( X + 1 )
150   POKE X, B:POKE X + 1, A
160   Y = 1
170 NEXT X
180 IF Y <> 0 THEN GOTO 100
190 END
```

If you run this program, you'll see the characters on the screen rearrange themselves in alphabetical order — really a CoCo-coded order, like ASCII. Figure 1 shows the results of the sort after the program is listed on the screen. The sort takes quite a long time in BASIC — about 58 minutes, depending on the characters' random order. How would this be done in assembly language?

The Assembly Language Version

The sort compares two values, the current location and the current location + 1. To compare in assembly language, we must have one value in a register — typically the A or B register — and compare it with another value in memory. In

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years' experience in the industry covers a wide background: programming, systems analysis and managing projects for computers ranging from mainframes to micros.

[illegible]

ag. A '1' is loaded into the register to indicate the if no change occurs, the register will hold 0): LDY #1
ANGE".

ntire code, including a compare instruction, swap (if necessary) and set change flag, now looks like this:

```
LDA    ,X+    GET FIRST ENTRY
CMPA    ,X    CMPARE TO I+1
BLS    DNE70  GD IF ENTRY I GE ENTRY I+1
LDB    ,X    GET SECDND ENTRY
STB    -1,X  SWAP B TO A
STA    ,X    SWAP A TO B
LDY    #1    SET "CHANGE"
```

At this point, we also know that the Y register is initially set to 0 and that the X register points to the start of the screen memory:

```
LDX    #$400  POINT TO SCREEN
LDY    #0    SET CHANGE FLAG TO 0
LDA    ,X+    GET FIRST ENTRY
CMPA    ,X    CMPARE TO I+1
BLS    DNE70  GD IF ENTRY I GE ENTRY I+1
LDB    ,X    GET SECOND ENTRY
STB    -1,X  SWAP B TO A
STA    ,X    SWAP A TO B
LDY    #1    SET "CHANGE"
```

Since this action is taken for every screen location from \$400 to \$5FE, stopping at \$5FE, we must have a way to stop the compare instruction. X is incremented from \$400 through \$5FE. When it reaches \$5FF, we should stop to see if the change flag has been set. If it has, we must go back for another pass. If it has not, the sort is complete. If X does not stop at \$5FF, however, we'll continue looping and compare for this pass:

```
CMPX    #$5FF  TEST FOR SCREEN END
BNE    ONE10   GD IF NDT DNE PASS
```

If one pass has been completed, test the change flag by comparing the contents of the Y register with 0 and branching back if Y = 1 (indicating that at least one swap has occurred):

```
CMPY    #0    TEST CHANGE FLAG
BNE    HUNDRD  GD IF CHANGE OCCURRED
```

The whole sequence now looks like this:

```
LDX    #$400  POINT TO SCREEN
LDY    #0    SET CHANGE FLAG TO 0
LDA    ,X+    GET FIRST ENTRY
CMPA    ,X    COMPARE TO I+1
BLS    DNE70  GO IF ENTRY I GE ENTRY I+1
LDB    ,X    GET SECOND ENTRY
STB    -1,X  SWAP B TO A
STA    ,X    SWAP A TO B
LDY    #1    SET "CHANGE"
CMPX    #$5FF  TEST FOR SCREEN END
BNE    DNE10   GD IF NDT DNE PASS
CMPY    #0    TEST CHANGE FLAG
BNE    HUNDRD  GO IF CHANGE OCCURRED
```

There are several branches in this sequence. We've named them to correspond to the BASIC implementation of this sort.

If we use *labels* instead of line numbers, as in BASIC, we have:

```
HUNDRD  LDX    #$400  POINT TO SCREEN
        LDY    #0    SET CHANGE FLAG TO 0 DNE10
        LDA    ,X+    GET FIRST ENTRY
        CMPA    ,X    CMPARE TO I+1
        BLS    DNE70  GO IF ENTRY I GE ENTRY I+1
        LDB    ,X    GET SECDND ENTRY
        STB    -1,X  SWAP B TO A
        STA    ,X    SWAP A TO B
        LDY    #1    SET "CHANGE"
DNE70    CMPX    #$5FF  TEST FOR SCREEN END
        BNE    DNE10   GD IF NOT ONE PASS
        CMPY    #0    TEST CHANGE FLAG
        BNE    HUNDRD  GD IF CHANGE OCCURRED
```

(I've indented to indicate the inner loop.)

Hand Coding

My first program — one that read a single punched card from a card reader and then boot the system — was completely hand coded. In one card, I made a quantum leap in my understanding of assembly language programming. I'm not saying that hand coding this program will do the trick for you, but it may help.

The first step in hand coding is to make a skeleton of the instructions based upon instruction length. You can find the instruction length in the list of instructions found in the back of assembler manuals, on a 6809 instruction sheet or in books on 6809 programming. As I explained in the last column, different addressing modes require different instruction lengths, as do different types of instructions. Branch instructions are always two bytes — opcode followed by displacement value. *Load immediate* instructions are two or three bytes — opcode followed by a 1-byte (A or B) value or a 2-byte (D, X or Y) value. *Load from memory* instructions are 3-byte instructions — opcode followed by two bytes of

Two-Liner Contest Winner . . .

Here is a utility to display a slower, more organized directory listing, good for those who find it difficult to keep up with DIR's fast scroll-through. It handles up to 72 files.

*Not a spacebar for individual
The listing: page listing.*

```
Ø CLS: CLEAR2ØØØ: K=Ø: M=1: FORA=3 TO
11: DSKI$ Ø,17,A,B$,C$: D$=B$+LEFT
$(C$,127): E$(Ø)=LEFT$(D$,8): FOR
F=1 TO 7: E$(F)=MID$(D$,F*32+1,8): N
EXTF: FOR G=Ø TO 7: PRINTØK,"#";M")"
E$(G): K=K+16: M=M+1: IF K>5ØØ THEN
K=48Ø
1 EXEC44539: NEXTG: NEXTA: END
```

Want to see my Coo 3!

John M. Beck
Suitland, MD

(For this winning two-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape*.)

memory address. *Indexed addressing* instructions vary depending upon the offset. The skeleton here looks like this:

```

XXXXXX HUNDRO LOX #5400 POINT TO SCREEN
XXXXXXXX LOY #0 SET CHANGE FLAG TO 0
XXXX ONE10 LOA ,X+ GET FIRST ENTRY
XXXX CMPA ,X COMPARE TO I+1
XXXX BLS ONE70 GO IF ENTRY I GE ENTRY I+1
XXXX LOB ,X GET SECOND ENTRY
XXXX STB -1,X SWAP B TO A
XXXX STA ,X SWAP A TO B
XXXXXXXX LOY #1 SET "CHANGE"
XXXXXXXX ONE70 CMPX #55FF TEST FOR SCREEN END
XXXX BNE ONE10 GO IF NOT ONE PASS
XXXXXXXX CMPY #0 TEST CHANGE FLAG
XXXX BNE HUNDRO GO IF CHANGE OCCURRED

```

Each two X's represent two hexadecimal digits or one byte. Now we can add the opcodes for the instructions by finding them in the instruction list:

```

BEXXXX HUNDRO LOX #5400 POINT TO SCREEN
10BEXXXX LOY #0 SET CHANGE FLAG TO 0
A6XX ONE10 LOA ,X+ GET FIRST ENTRY
A1XX CMPA ,X COMPARE TO I+1
23XX BLS ONE70 GO IF ENTRY I GE ENTRY I+1
E6XX LOB ,X GET SECOND ENTRY
E7XX STB -1,X SWAP B TO A
E7XX STA ,X SWAP A TO B
10BEXXXX LOY #1 SET "CHANGE"

```

```

BCXXXX ONE70 CMPX #55FF TEST FOR SCREEN END
26XX BNE ONE10 GO IF NOT ONE PASS
10BCXXXX CMPY #0 TEST CHANGE FLAG
26XX BNE HUNDRO GO IF CHANGE OCCURRED

```

Note that some opcodes are made up of two bytes. Motorola ran out of opcodes and also wanted to make frequently used instructions shorter.

Now we can add the immediate values — values loaded into a register and found within the instruction. For example, the LDX instruction loads \$400 into the X register:


```

BE0400 HUNDRO LOX #5400 POINT TO SCREEN
10BE0000 LOY #0 SET CHANGE FLAG TO 0
A6XX ONE10 LOA ,X+ GET FIRST ENTRY
A1XX CMPA ,X COMPARE TO I+1
23XX BLS ONE70 GO IF ENTRY I GE ENTRY I+1
E6XX LOB ,X GET SECOND ENTRY
E7XX STB -1,X SWAP B TO A
E7XX STA ,X SWAP A TO B
10BE0001 LOY #1 SET "CHANGE"
8C05FF ONE70 CMPX #55FF TEST FOR SCREEN END
26XX BNE ONE10 GO IF NOT ONE PASS
10BC0000 CMPY #0 TEST CHANGE FLAG
26XX BNE HUNDRO GO IF CHANGE OCCURRED

```

Now let's tackle the branches. In the last column, we learned that branches use a relative addressing mode, which adds the current location to a displacement field in the instruction. To hand code this value, do the following: For a forward branch, start at 0=next instruction after the

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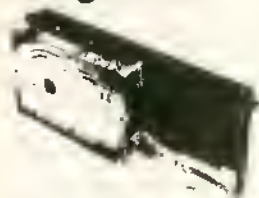
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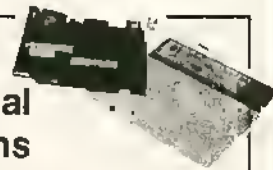
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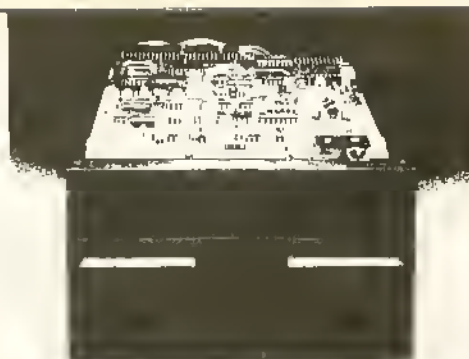
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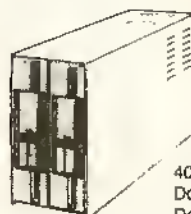
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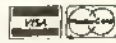
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branch and add one for each following byte. For a backward branch, start at the \$FF=second byte of the branch and subtract one for each of the above. Thus, if BNE DNE10 branches back 21 bytes, start at FF (the second byte of BNE), and move back in the following manner: FF, FE, FD, FC, FB, FA, F9, F8, F7, F6, F5, F4, F3, F2, F1, F0, EF, EE, ED, EC to EB (first byte of LDA). The machine language commands would look like this:

```
BE0400  HUNDRD LDX  #5400  POINT TO SCREEN
10BE0000  LDY  #0  SET CHANGE FLAG TO 0
A6XX  ONE10  LDA  ,X+  GET FIRST ENTRY
A1XX  CMPA  ,X  COMPARE TO I+1
230A  BLS  ONE70  GO IF ENTRY I GE ENTRY I+1
E6XX  LDB  ,X  GET SECOND ENTRY
E7XX  STB  -1,X  SWAP B TO A
A7XX  STA  ,X  SWAP A TO B
10BE0001  LDY  #1  SET "CHANGE"
BC05FF  ONE70  CMPX  #55FF  TEST FOR SCREEN END
26EB  BNE  ONE10  GO IF NOT ONE PASS
10BC0000  CMPY  #0  TEST CHANGE FLAG
26DE  BNE  HUNDRD  GO IF CHANGE OCCURRED
```

Now we can fill in the second byte of the *indexed* instructions. These are a bit tricky. You must note what type of indexing is being used and whether there's a displacement value. You must also code in the index register field, RR. Here the code value for the index register is 00, for X. The trickiest coding is for the STB -1,X, which is coded as 00011111. The RR register code is 00, so the result is 00011111. The five-bit field holds the displacement value of 111111, equal to -1 in two's complement notation.

```
BE0400  HUNDRD LDX  #5400  POINT TO SCREEN
10BE0000  LDY  #0  SET CHANGE FLAG TO 0
A6B0  ONE10  LDA  ,X+  GET FIRST ENTRY
```

```
A1B4  CMPA  ,X  COMPARE TO I+1
230A  BLS  ONE70  GO IF ENTRY I GE ENTRY I+1
E6B4  LDB  ,X  GET SECOND ENTRY
E71F  STB  -1,X  SWAP B TO A
A7B4  STA  ,X  SWAP A TO B
10BE0001  LDY  #1  SET "CHANGE"
BC05FF  ONE70  CMPX  #55FF  TEST FOR SCREEN END
26EB  BNE  ONE10  GO IF NOT ONE PASS
10BC0000  CMPY  #0  TEST CHANGE FLAG
26DE  BNE  HUNDRD  GO IF CHANGE OCCURRED
```

Finding a Place for the Code

Now that we have the code, we need to know where to put it. If we use assembly language code with BASIC, we must place the code out of harm's way. We don't want BASIC to clobber the machine language bytes as it stores variables or internal variables. One way to do this is by using the CLEAR command in BASIC. This command allocates string space and protects a block of memory. For example, CLEAR 300,&H3EFF allocates 300 bytes of string space and protects all memory above \$3EFF — just a little under the 16K point. There's still enough room for BASIC to function in the memory under this point.

There are other places we *could* put the machine language bytes (such as in the middle of large arrays or in strings), but this is the safest place — a place that will never be touched by BASIC.

Now that we know where the machine language bytes go, we can assign locations to each of the instructions. Because some instructions refer to absolute memory locations (such as LDA CONSNT, instruction locations should be assigned *after* making the skeleton of instruction lengths. We are going to do it now. (We are lucky that the program above is relocatable anywhere in memory — it contains no absolute addresses.)

We can see from the code shown in Figure 2 that the machine language bytes occupy memory from \$3F00 to \$3F21. Now, how do we get them there? Assuming that we're

```
3F00  BE0400  HUNDRD LDX  #5400  POINT TO SCREEN
3F03  10BE0000  LDY  #0  SET CHANGE FLAG TO 0
3F07  A6B0  ONE10  LDA  ,X+  GET FIRST ENTRY
3F09  A1B4  CMPA  ,X  COMPARE TO I+1
3F0B  230A  BLS  ONE70  GO IF ENTRY I GE ENTRY I+1
3F0D  E6B4  LDB  ,X  GET SECOND ENTRY
3F0F  E71F  STB  -1,X  SWAP B TO A
3F11  A7B4  STA  ,X  SWAP A TO B
3F13  10BE0001  LDY  #1  SET "CHANGE"
3F17  BC05FF  ONE70  CMPX  #55FF  TEST FOR SCREEN END
3F1A  26EB  BNE  ONE10  GO IF NOT ONE PASS
3F1C  10BC0000  CMPY  #0  TEST CHANGE FLAG
3F20  26DE  BNE  HUNDRD  GO IF CHANGE OCCURRED
3F22
```

Figure 2

going to be working in BASIC, we can use the BASIC POKE statements to move any type of data anywhere we want within the 64K addressing space of BASIC. The easiest way to do this is to list the data in DATA statements and then to use a loop to move the data:

```
900 CLEAR 300, &H3EFF
1000 DATA &HBE, &H04, &H00, &H10, &HBE, &H00, &H00,
&HAE
1001 DATA &H80, &HA1, &HB4, &H23, &H0A, &HE6, &HB4,
&HE7
1002 DATA &H1F, &HA7, &HB4, &H10, &HBE, &H00, &H01,
&HBC
1003 DATA &H05, &HFF, &H26, &HEB, &H10, &HBC, &H00,
&H00
1004 DATA &H26, &HDE
1010 FOR I = &H3F00 TO &H3F21: READ A: POKE I, A:
NEXT
```

The loop at Line 1010 moves the 22 bytes of data into the \$3F00 protected area.

Next, now that we have the machine language code there, how do we get to it? Here again, BASIC has the answer. The DEFUSR statement defines where the code is. There's an ID number attached to this statement so it becomes DEFUSR0 - DEFUSR9, but since we have only one machine language program we'll use DEFUSR0. Once defined, the code is called by a USR0 statement, which tells the BASIC interpreter to use

the defined location and transfer control to the machine language program found there:

```
900 CLEAR 300, &H3EFF
1000 DATA &HBE, &H04, &H00, &H10, &HBE, &H00, &H00,
&HAE
1001 DATA &H80, &HA1, &HB4, &H23, &H0A, &HE6, &HB4,
&HE7
1002 DATA &H1F, &HA7, &HB4, &H10, &HBE, &H00, &H01,
&HBC
1003 DATA &H05, &HFF, &H26, &HEB, &H10, &HBC, &H00,
&H00
1004 DATA &H26, &HDE
1010 FOR I = &H3F00 TO &H3F21: READ A: POKE I, A:
NEXT
1020 DEFUSR0 = &H3F00
1030 A+USR0(0)
1040 GOTO 1040
```

We are now all set to call the program, or are we? Once the program is executed, what will happen? The last instruction was a BNE. It branches back to the beginning of the bubble sort if the data is not sorted. However, if the data is sorted, the next instruction in sequence is executed. But there is no next instruction. Since the next instruction will be garbage, the program will probably blow up in some strange loop after the sort is done.

After the sort let's return to a BASIC calling program by



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using a stack (described last month). The stack saves the return address of a control point in the BASIC interpreter. We can pop that return address by including a 6809 RTS (Return from subroutine) instruction as the *last* instruction of the machine language code as shown in Figure 3.

"Assembly language is tedious, and it is hard to learn. But if you want to do things that you just can't do in compiled languages, assembly language is the only way to go."

We'll have to include that in the storage portion of the BASIC program as well:

```
900 CLEAR 300, &H3EFF
1000 DATA &HBE, &H04, &H00, &H10, &HBE, &H00, &H00,
&HAG
1001 DATA &H80, &HA1, &HB4, &H23, &H0A, &HE6, &HB4,
&HE7
1002 DATA &H1F, &HA7, &HB4, &H10, &HBE, &H00, &H01,
&HBC
1003 DATA &H05, &HFF, &H26, &HEB, &H10, &HBC, &H00,
&H00
1004 DATA &H26, &HDE, &H39
1010 FOR I = &H3F00 TO &H3F22: READ A: POKE I, A:
NEXT
1020 DEFUSR0 = &H3F00
1030 A = USR0(0)
1040 GOTO 1040
```

Now we *are* all set to run the sort. The USR0 will transfer control to the machine language code; the screen sort will be done; the RTS will return control to BASIC. BASIC will execute the next instruction after the USR0 that is, in this case, a continual loop so screen result is not disturbed.

If you run this code, you'll see a rapid sort of the screen. This is several times faster than the equivalent BASIC code, and *speed* is the reason that assembly language is used.

Assembler Assembling

You can see that it is possible to hand assemble machine language code. However, it's very tedious. Grace Hopper, the major force behind COBOL, says that it's almost impossible to assemble a string of 40 ones and zeroes and not make a mistake. For this reason, it's much easier to assemble the code automatically. The symbolic code:

HUNDRO	LDX	#\$400	POINT TO SCREEN
	LDY	#0	SET CHANGE FLAG TO 0
ONE10	LDA	,X+	GET FIRST ENTRY
	CPMA	,X	COMPARE TO I+1
	BLS	ONE20	GO IF ENTRY I GE ENTRY I+1
	LDB	,X	GET SECDND ENTRY
	STB	-1,X	SWAP B TO A
	STA	,X	SWAP A TO B
	LDY	#1	SET "CHANGE"
ONE20	CMPL	#\$5FF	TEST FOR SCREEN END
	BNE	ONE10	GO IF NOT ONE PASS
	CMPL	#0	TEST CHANGE FLAG
	BNE	HUNDRO	GD IF CHANGE OCCURRED
	RTS		RETURN TO BASIC

is entered into the assembler program. This *source code* is the actual assembly language. The assembler then proceeds in the same way that we procceded in hand assembling. It makes one pass through the lines of code, allocates space for

3F00	BE0400	HUNDRO	LDX	#\$400	POINT TO SCREEN
3F03	10BE0000		LDY	#0	SET CHANGE FLAG TO 0
3F07	A6B0	ONE10	LDA	,X+	GET FIRST ENTRY
3F09	A1B4		CPMA	,X	COMPARE TO I+1
3F0B	230A		BLS	ONE20	GO IF ENTRY I GE ENTRY I+1
3F0D	E6B4		LDB	,X	GET SECDND ENTRY
3F0F	E71F		STB	-1,X	SWAP B TO A
3F11	A7B4		STA	,X	SWAP A TO B
3F13	10BE0001		LDY	#1	SET "CHANGE"
3F17	BC05FF	ONE20	CMPL	#\$5FF	TEST FOR SCREEN END
3F1A	26EB		BNE	ONE10	GO IF NOT ONE PASS
3F1C	10BC0000		CMPL	#0	TEST CHANGE FLAG
3F20	26DE		BNE	HUNDRO	GD IF CHANGE OCCURRED
3F22	39		RTS		RETURN TO BASIC
3F23					

Figure 3

each instruction and assigns opcodes. It also builds a symbol table of all labels and symbols in the code. The symbol table for this code would look like this:

HUNDRO	\$3F00
ONE10	\$3F07
ONE70	#3F17

The assembler now makes a second pass and fills in opcodes, displacements, and absolute addresses. The result is *object code* that looks much like the machine language code we generated. This object code is usually loaded by a *loader*, resulting in true machine language code — ones and zeroes.

If you understand what's happening in the process above, the assembler won't pose any problems for you. Assemblers have a few more commands called *pseudo-operations* or *pseudo-ops* that allow you to define the origin of the program, allocate space for constants or define constants, define text strings, etc., but these are relatively easy to understand.

As I mentioned in the previous column, one of the best assemblers for the CoCo was Disk *EDTASM*. I say *was* because Radio Shack has discontinued it. Disk *EDTASM* was like *Turbo PASCAL* for the PC compatibles — it operated in a highly interactive environment that allowed you to edit a program, quickly assemble it *in memory* and then debug the assembled code, all in the same program. It was a one-step process. If you want to learn assembly language, I suggest that you look for a copy of this. Once you *know* assembly language, the assembler you use is not as critical, but Disk *EDTASM* is a great learning tool.

A Second Example

Let's try a second example:

```

100 CLS 110 X = 16: Y = 8
120 DX = 1: DY = 1
130 L = &H400 + 8 * 32 + 16
140 X = X + DX
150 Y = Y + DY
160 IF ( X < 0 OR X > 31 ) THEN DX = -DX: X = X + DX
170 IF ( Y < 0 OR Y > 14 ) THEN DY = -DY: Y = Y + DY
180 POKE &H400 + L, 96
190 L = Y * 32 + X
200 POKE &H400 + L, 79
210 GOTO 140

```

This BASIC code clears the text screen and then moves an 'O' around inside the screen on a diagonal path. As the 'O' is moved, the old position is erased. The effect is like the cursor in an old *Pong* game — the cursor bounces around within the screen.

As in the first example, each poke is used to set characters on the screen directly. Character 96 is a space, which clears the character position. Character 79 is an uppercase 'O'. Variable X, the column, varies from 0 to 31. Variable Y, the row, varies from 0 to 14. Using up to 15 rows traces the same path, and the display is not very interesting.

The variables DX and DY are the increments to add to X and Y. At the start, the increments are one and one, which results in the movement of one character position over and one down. When Character O hits the side of the screen, however, one or both of the increments are changed by negation. This changes the direction of the move. Both change at a corner.

How would this be coded in assembly language? The assembly language program for this is shown in Listing 1. It follows the same logic as the BASIC program. As you can see, this is an *EDTASM+* (Disk *EDTASM*) listing. The source code (the text) contains the pseudo-op ORG to set the origin to \$3F00 and several FCB pseudo-ops to initialize variables. Otherwise, you'll find it easy to follow. The listing also includes absolute addresses in some of the instructions, unlike our first example. Variables XR, YR, DX, and DY are located in absolute addresses.

The BASIC code for the program is shown in Listing 2. It uses the same scheme of relocation by DATA values we used in the first example. There is no RTS; however, the display runs continuously (reset to regain control). If you run the program, you'll be amazed — nothing shows up on the screen. Why?

This program is so much faster than the BASIC version that the 'O' is moving too fast to be seen. If you don't believe me, substitute &H12, &H12 for the &HA7, &HB4 in Line 180. This will prevent the old character from being erased. Now when you run the program you see the screen fill up with O's as the "cursor" moves around the entire screen in the wink of an eye.

This is a very brief introduction to assembly language. Assembly language is tedious, and it is hard to learn. But if you want to do things that you just can't do in compiled languages, assembly language is the only way to go.

See you next month with more CoCo topics. □

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Listing 1: PONGBIN

3F00		00100	ORG	\$3F00	
3F00 8E	0510	00110 PINGPO	LDX	#510	X=16, Y=8
3F03 B6	3F4F	00120 PPM	LDA	XR	X
3F06 BB	3F51	00130	ADDA	DX	X=X+DX
3F09 2C	06	00140	BGE	PP1	GO IF GE 0
3F0B 70	3F51	00150	NEG	DX	FLIP X DIRECTION
3F0E BB	3F51	00160	ADDA	DX	BACK
3F11 81	1F	00170 PP1	CMPA	#31	TEST
3F13 2F	06	00180	BLE	PP2	GO IF GT 31
3F15 70	3F51	00190	NEG	DX	FLIP X DIRECTION
3F18 BB	3F51	00200	ADDA	DX	BACK
3F1B F6	3F50	00210 PP2	LDB	YR	SAME FOR Y IN B
3F1E FB	3F52	00220	ADDB	DY	
3F21 2C	06	00230	BGE	PP3	
3F23 70	3F52	00240	NEG	DY	
3F26 FB	3F52	00250	ADDB	DY	
3F29 C1	0E	00260 PP3	CMPB	#14	
3F2B 2F	06	00270	BLE	PP4	
3F2D 70	3F52	00280	NEG	DY	
3F30 FB	3F52	00290	ADDB	DY	
3F33 B7	3F4F	00300 PP4	STA	XR	STORE NEW X
3F36 F7	3F50	00310	STB	YR	STORE NEW Y
3F39 86	60	00320	LDA	#96	BLANK
3F3B A7	84	00330	STA	,X	ERASE OLD
3F3D 86	20	00340	LDA	#32	A=32, B=Y
3F3F 3D		00350	MUL		Y*32
3F40 F3	3F4E	00360	ADDD	XR-1	Y*32+X
3F43 C3	0400	00370	ADDD	#400	ADD START OF SCREEN
3F46 1F	01	00380	TFR	D,X	NOW IN X
3F48 86	4F	00390	LDA	#79	O
3F4A A7	84	00400	STA	,X	IN NEW POSITION
3F4C 20	B5	00410	BRA	PPM	CONTINUOUS LOOP
3F4E	00	00420	FCB	0	
3F4F	10	00430 XR	FCB	16	MUST BE 16 BITS
3F50	08	00440 YR	FCB	8	
3F51	01	00450 DX	FCB	1	
3F52	01	00460 DY	FCB	1	
	0000	00470	END		

000000 TOTAL ERRORS

Listing 2: PONGBAS

100 CLEAR 300, &H3EFF	F, &H4F, &HF7, &H3F
110 DATA &HBE, &H05, &H10, &HB6, &H3	1B0 DATA &H50, &HB6, &H60, &HA7, &H8
F, &H4F, &HBB, &H3F	4, &HB6, &H20, &H3D
120 DATA &H51, &H2C, &H06, &H70, &H3	190 DATA &HF3, &H3F, &H4E, &HC3, &H0
F, &H51, &HBB, &H3F	4, &H00, &H1F, &H01
130 DATA &H51, &H81, &H1F, &H2F, &H0	200 DATA &HB6, &H4F, &HA7, &HB4, &H2
6, &H70, &H3F, &H51	0, &HB5, &H00, &H10
140 DATA &HBB, &H3F, &H51, &HF6, &H3	210 DATA &H0B, &H01, &H01
F, &H50, &HFB, &H3F	220 FOR I=&H3F00 TO &H3F52: READ
150 DATA &H52, &H2C, &H06, &H70, &H3	A: POKE I, A: NEXT I
F, &H52, &HFB, &H3F	230 FOR I=&H3F00 TO &H3F52: PRIN
160 DATA &H52, &HC1, &H0E, &H2F, &H0	T HEX\$(PEEK(I)); " ";: NEXT I
6, &H70, &H3F, &H52	240 CLS
170 DATA &HFB, &H3F, &H52, &HB7, &H3	250 DEFUSR0 = &H3F00
	260 A = USR0(0)

Introducing the OS-9 Team

By Richard A. White
Rainbow Contributing Editor

Last month, we discussed some general operating system ideas and the ways in which OS-9 differed from them. All operating systems must connect the computer's computing and memory areas to its input and output components. An operating system provides the connections to the outside world. Most operating systems hide this connecting code in a program that is loaded when the computer is booted.

Because you seldom need to know this code, you would not need to know its location. There is a problem, however, if the operating system is not set up for new hardware you want to add.

One solution to this problem is buying a new version of the operating system. Owners of MS-DOS machines have done this many times. ("Want a hard disk? Fine. But Version 2.1 of DOS won't work with this. A 3.1 will work just fine. \$50 please. You only have 256K of RAM? That's a little small for Version 3.1. Oh, it will fit fine, but nothing else will fit with it. For \$250 we have this memory upgrade board to take you to 640K.")

Richard White lives in Fairfield, Ohio, has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the co-author of the TIMS database management program.

OS-9 was designed to handle such situations without causing the trauma that other systems cause. Higher-performance options are not quite free, but the cost is compensated by the intellectual challenge. OS-9 can be altered so easily because the user can get to each of the operating system modules and change or replace them, or add others. In this article, we will discuss why and how you make changes in your OS-9 system.

Modules

There is a distinction between user and system modules. While user modules are loaded and used after booting a system, system modules are included in the kernel and boot files. Kernel files contain the programs that start and manage the system's operation. Input and output (I/O) files communicate with attached hardware. All system modules should be in the kernel or in OS9Boot. As we go along, note which modules should be in OS9Boot and which should not. Under Level II, the kernel includes REL, Boot, OS9p1, OS9p2, Init, CC3Go and Clock. The first three are stored on Track 34 of the boot disk and are loaded when you type DOS to start up OS-9. REL resets the system hardware, prepares it for OS-9 and calls OS9p1. OS9p1 initializes the system, and Boot loads OS9Boot.

Init, OS9p2, CC3Go and Clock must be in your OS9Boot file. Init is not a

program. It is a data module containing system constants. OS9p2 handles memory management, the module directory and functions associated with module management, and process control. This is the heart of multitasking capability in OS-9. CC3Go now loads *Shell* and *GrfDrv*, establishes communications with *Shell* and starts the StartUp file.

Shell handles communication between you and the computer. The program interprets commands that are typed in and calls the proper operating system code to execute them. Though not part of the operating system, it may be considered an application program that interfaces with the operating system. *Shell* is designed to be loaded separately from OS9Boot as is *GrfDrv*. Do not put either of these into your OS9Boot.

Shell's input may come from sources other than the keyboard. Input can also be redirected from any source managed by OS-9. Typically, alternate input comes from a disk file containing commands identical to those typed from the keyboard. The StartUp file is one such disk file. But CC3Go automatically starts the process of reading this file on boot. *Shell* interprets commands from StartUp as if they had been typed. A simple StartUp file provided with OS-9 sends a welcome message to the screen and runs Setime to set Clock to the present date and time. StartUp can be quite long. Mine exceeds 50 lines.

About The One-Liner Contest . . .

THE RAINBOW's One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be very short.

Send your entry (preferably on cassette or disk) to:

THE RAINBOW
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Managers and Submanagers

We have discussed some of the OS-9 modules that get things started, but other modules that have been involved deserve our attention. The StartUp file was read in. The modules that manage system startup need help reading it. The Boot module contains enough code to find and read in OS9Boot, but any other disk access is beyond its capability. It finds OS9Boot by its length. Boot reads sectors in sequence looking for OS9 Boot's length. If OS9Boot were split into two parts, Boot would be defeated. StartUp may be anywhere on the disk and may be split into separated sectors. A more competent disk handler than Boot is needed.

"OS-9 can be altered so easily because the user can get to each of the operating system modules and change or replace them, or add others."

All data transfer from and to the computer's hardware (drives, printer and terminal) is managed by the I/O manager called IOMan. In addition, IOMan takes care of communications between processes — tasks that do not involve hardware but have functional similarities. To accomplish its role, IOMan uses three submanagers that are designed to handle different types of communications.

The simplest type of communication is a stream of characters. The keyboard generates such a stream, which is irregular and unpredictable in terms of when characters are sent and how characters are grouped. The computer deals with the characters one at a time as they are presented to it. This stream is called a sequential character file and its submanager is named SCF. The screen, printer and modem are also SCF devices. SCF can handle any number of these devices and is limited only by what can be attached to a CoCo.

Disk drives are organized into blocks of data called sectors. When a disk is read, a block of data of known size (256 bytes on the CoCo) is loaded in. A block of memory must be received, stored in

a defined area of memory (the buffer). It must then be read (out of the buffer), as needed, to the using application in the character stream. Because the sectors containing the required data may be distributed at random locations on the disk, the submanager must read the disk's file allocation table and determine the sectors and the order it needs to call. This submanager's basic function is to handle random blocks. The submanager's name, RBF, refers to random block files.

RBF manages any storage device based on blocks of data, including floppy disks, hard drives and RAM disks. Compare this with Boot's disk access code that reads in OS9Boot. Boot can only find where OS9Boot starts on a disk and the number of contiguous sectors it occupies. If OS9Boot is divided into parts that are at different locations on a disk, Boot cannot operate. For this reason, always use a newly formatted disk to make a new boot disk so that OS9Boot will *not* be saved in two places.

Communications between processes have complexities all their own. The sending process cannot generate data faster than the receiving process can handle it. The submanager controlling the process must know the needs of the receiving process and control the sending process so that it does not exceed these needs. In this respect, this submanager is like RBF, which ensures that the data rate does not exceed the storage rate of the storage device. However, there is no block organization to the data. The process of transferring data from one operating process to another is called piping; therefore, the submanager is named PipeMan.

Drivers

Human managers organize, direct and control, but seldom do any of the actual work that makes something happen. OS-9 managers and submanagers are no different. Their management duties are all they can handle, and they need help carrying out their functions. Their helpers are called drivers, and these do the actual work of transferring data to and from processes and hardware.

The standard device drivers supplied with OS-9 are CC3IO (handles the terminal functions), CC3Disk (handles floppy disks), Piper (works with pipes), Printer, RS-232 and Modem. ACIAPAK replaces RS-232 if you use the RS-232 in your Multi-Pak Interface. Most specialized hardware use special

drivers. The hard disk, for instance, requires an additional driver. Like CC3Disk, this driver works with RBF.

If the basic OS-9 design philosophy is followed, a driver can handle a variety of similar devices having different characteristics. Floppy drives, for example, have changed drastically in the last eight years. When the first CoCo came out, a 5¼-inch drive was typically a single-sided, single-density, 35-track device that stored less than 100K. The first CoCo drive added double-density, 156K storage. A friend who owned a Model I told me I would only need four or five disks because of their large capacity. I almost believed him.

A couple of years later, double-sided, 40-track drives were standard on IBM PC's. Now single-sided drives are not even made, and 3½-inch drives that store 720K are common.

When Radio Shack brought out OS-9 Level I for the CoCo, it must have believed my friend. The disk driver was hard-coded to use 35-track, single-sided disks only. This change in OS-9 design made it impossible to use larger drive capacities with the stock driver. How should it have been done?

With OS-9, the driver obtains the characteristics of a device from a data module (a device descriptor) each time it needs to access that device. This is what Level II CC3Disk does. The device descriptors carry the names used to call the drive. If you want to load a program in the CMDS directory on disk 1, you type `LOAD/D1/CMDS/MYPROG`. *Shell* interprets this request and sends it to RBF, which works with CC3Disk to load the file. A first step is to read the drive characteristics from the device descriptor module, D1.

The characteristics stored in a device descriptor are the maximum capabilities of the drive. They tell OS-9 nothing about how the disk in that drive is formatted. The specifics about the disk itself are read from the disk and compared with the capacity given by the descriptor. As long as the disk characteristics are equal to or less than those reported by the descriptor, the disk can be read and written. So a 35-track, single sided disk works just fine in a 40-track, double-sided drive.

As noted, Level II comes with CC3Disk, which uses its device descriptors to determine the capabilities of

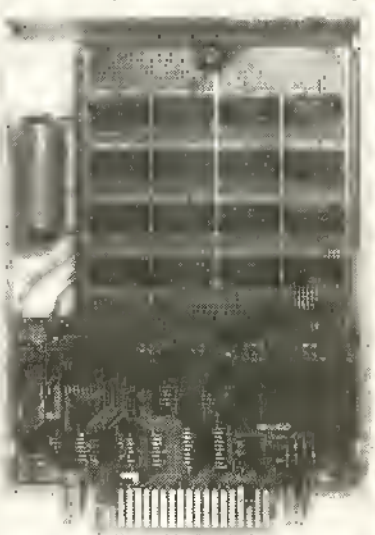
each drive. It also comes with various pre-made device descriptors covering some of the more popular drive choices. Not all possible descriptors are provided, and Murphy's Law requires that at least one that you want will not be there. For example, there is no 40-track single-sided descriptor. If you have such a drive, you can use the 35-track descriptor but not use the last five tracks. There are descriptors for the current standard 5¼-inch drive, which is 40-track, double-sided with a 6-ms step rate.

One of the favorite pastimes of OS-9 addicts is hacking the code. That means changing modules to make them better (though a pessimist, in a fit of kindness, might say to make them different). This has led to all sorts of patches, modified modules, rewritten modules and programs to do some of this. OS-9's database on Delphi is full of such information. Some of the information is quite useful. One in particular, *DMode* by Kevin Darling, provides a way to patch a module that is on a disk. With *DMode* and information in the OS-9 manuals, you can make any device descriptor you need.

Programs to make device descriptors

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are included in commercial packages such as *SDisk*. There are ways to do whatever is needed. When I installed my 3½-inch drive, I only needed to make a device descriptor and a new *OS9Boot* that included the descriptor.

CC3Disk cannot manage a hard drive, so a new driver is needed. Hard drive suppliers provide drivers with their packages and descriptors when appropriate. The user must make a new *OS9Boot*, which includes these modules, and proceed with the installations — it takes a little more than just a new boot. Burke & Burke began by providing only an interface and software, leaving users to supply their own hard drive. Thus, a wide variety of drives can be used. To solve the descriptor problem, Chris Burke wrote a program to make a descriptor that matches the drive used. This is fine for a person who can get a real deal on an older drive and the data to make the descriptor. However, it is a problem for the non-technical person. Burke & Burke now provides a complete package.

Next we have *Printer* and its descriptor *P*, which drives a printer through the serial port. Unless you have a very old printer, you will want to run it faster than the 600-baud default rate. *OS-9* provides *Xmode* to change *SCF* descriptors. Initially, run *Xmode* at the beginning of a session by typing *Xmode /p baud=4* to run at 2400 baud. (I have a serial-to-parallel converter, so I use *Xmode /p baud=6* and work at 9600 baud.) Next, automate the procedure by putting the *Xmode* statement in your *Startup* file. It will look exactly as you would type it from the keyboard, but it takes a few seconds for *Xmode* to load and run — a waste of precious time. So, the final step in the automation is to make a new boot using *P* after you have changed it with *Xmode*. (More about that in a later column.

Use *Xmode* to change the 300-baud default of *T1* or *T2* as well. These descriptors work with *RS-232* and the serial port, or the *ACIAPAK* and the *RS-232 Pak* respectively.

The last I/O system to be discussed is the terminal made up of your keyboard and your video display. In Level I, this was pretty simple. It consisted of the driver *CCIO* and the device descriptor *TERM*. With the arrival of the *CoCo 3*, a number of people wrote 80-column drivers, which were made available on information services like *Delphi* and allowed us to use the 80-column screen before the release of *OS-9 Level II*. Here, again, new hardware required

only a new driver and a new device descriptor.

OS-9 Level I does not provide graphics support, but the *BASIC9* package for Level I supplies a graphics interface module, *Gfx*. This is an assembly language program that handles both color graphics and joystick functions. *Gfx* is loaded, either before running *BASIC9* or by a *Shell* statement in the program, and then called by the program with the *BASIC9 RUN* statement. Like *Shell*, *Gfx* can be viewed as an applications program that interfaces with the operating system. Remember that all applications programs must be loaded separately and never be put into your *OS9Boot*.

One of the real strengths of *OS-9 Level II* is its windowing and graphics capabilities. The windowing capability coupled with multitasking sets *OS-9* apart from all other microcomputer operating systems. (The much ballyhooed *OS-2* for PC Compatibles lacks windowing, though windows will be provided by either *Microsoft Windows* or IBM's *Presentation Manager*.)

The modules involved in windows and graphics fit into the *OS-9* pattern. As always, there is a driver, *CCIO*, and a number of device descriptors. Each active window needs a separate device descriptor, but you can have more descriptors in your boot than you have active windows. In fact, you should so there are free descriptors for the new windows you open. Think of each window as a separate terminal, available to run its own program.

Two basic window device descriptors should be in your boot: *TERM*, a 32- or 40-character display in which *OS-9* boots up, and *W*, a generic descriptor is not used alone to run a window.

Your *OS-9* option may have additional window descriptors in your boot, generally named *W1*, *W2*, etc. *W1* through *W7* come with *OS-9 Level II*, and several are pre-configured. *W8* through *W15* come with *Multi-View*. Additional descriptors are available from the *Delphi OS-9 Database*, or can be made by you. Six or eight descriptors are generally sufficient; 15 is more than most people need.

Level II provides the major graphics capabilities available from the *Shell* level. To accomplish this, you need an interface module for your *OS9Boot* and an application program named *GrfDrv*, which *OS-9* automatically loads on boot. Two interface modules, *VDGInt* and *GRFInt*, come with Level II. *VDGInt* interface provides the *CoCo 1* and *2* with 192-by-256 pixel graphics

and a 32-character screen when using the *TERM* window. To use 40- or 80-character windows and the *CoCo 3's* high resolution graphics, *GRFInt* must be in your boot. The *Config* program lets you choose which interface to include in your boot, but you can include both. *WindInt* is an enhanced version of *GRFInt* that comes with *Multi-View*. It should replace *GRFInt* if you use it.

Remember, *GrfDrv* is a graphics application program required by Level II and automatically loaded at boot. It must *not* be in your *OS9Boot*. Like *Shell*, *GrfDrv* provides functions the system needs to handle the screen, but it is not part of the operating system.

The Summary

Those are the *OS-9* system modules, supporting application modules and their basic functions. To end, let us summarize the principle differences between Level I and Level II.

- Many of the Level I modules are unchanged in Level II. The kernel of the operating system was changed to deal with the expanded memory and its *GIME* memory manager chip.
- *CC3Disk* replaced the *CCDisk* of Level I and reads the disk drive device descriptors. *CC3Disk* lets you fully customize your system to your drive.
- *CC3IO* is the new keyboard and video graphics device driver that deals with the window device descriptors.
- *GrfDrv* is an entirely new program containing a complete set of graphics primitives accessible from the keyboard, batch files or machine language programs. There are few limits: If you want 15 windows, you can have 15 windows. Each will support what is, in effect, a separate terminal with a separate application running or ready to run.
- If you get a hard disk, describe it in a device descriptor and add it, and its driver, to your boot.

There is a lot of effort involved in learning how to set up and use *OS-9*. Actually, the setup is the hard part. A *Startup* file can load program modules, initialize windows, start applications and hand the user a machine that is ready to edit text, work on a spreadsheet, and call up a *Bulletin Board System* at the press of the *CLEAR* key. The investment comes in learning to configure the boot, write *Startup* files and do this work. Those not wanting to make this investment in time may not want to dabble in *OS-9*. But who knows when they will change their minds? ☺



Another Cry for Standards

By Dale L. Puckett
Rainbow Contributing Editor

This month's column will explain why a standard, intuitive user interface is needed in OS-9 application programs and will present a listing of Bill Brady's FMenu, a procedure file that modifies OS-9 Level 1 CCDisk drivers and a format utility that recognizes and uses double-sided disk drives. I'll pass along a small correction to last month's Gfx3 listing and give you a few lines of code that put the new functions to good use.

Designed With the User in Mind

Why do we keep coming back to standards? Most of us buy a CoCo because we have a job for it to do. However, after we bring it home, we discover that it can do *many* jobs. Unfortunately, every time we buy a new software package, we have to learn how to run the CoCo again. This is neither fair nor productive.

For OS-9 to survive in the CoCo market, the number of application programs must rival the number avail-

able for Disk BASIC-based Color Computers. Moreover, these new applications must be easier to use than the present crop of Disk BASIC programs, and they all must work the same way.

Tandy recognized the problem several years ago and had Microware develop *Multi-Vue*. Now we must force the software developers (who depend on us to buy their products) to use *Multi-Vue* and create a standard way to do everything that a program must do. We must also insist that the forum SysOps (whose royalty checks depend on the time we use their databases) show others how to use *Multi-Vue* so that our hackers can standardize and enhance the public domain software they make available to us.

We can't insist that newcomers to OS-9 learn to use its internal power. Everyone would be better off if this work were done inside all OS-9 application programs. Indeed, the millions of CoCo owners now stuck with Disk BASIC applications might join us if they could use OS-9 to do their work without learning a new routine for every application.

Wouldn't we rather sell our application software to a base of several million users than to three or four thousand hackers? Don't we need the money?

Take this indictment seriously, but don't absorb too much guilt. After all, the MS-DOS world suffers from the

same problem. When you buy a new MS-DOS application program for your business, you still need to send your employees to school for two or three days — and pay the expert \$695 per employee for the honor.

However, MS-DOS machines are generally owned by large companies that can afford to pay for this training. CoCo owners, on the other hand, can barely afford the price of new software. (They certainly can't afford the time to learn excessively complex operating system details that have nothing to do with the work at hand.) We must hide these complexities from these CoCo owners if we want them to use our products and buy OS-9 application software.

During a recent conversation with a Tandy official, I asked if there was anything new and exciting on the horizon. "New and exciting?" he asked. "We've made the tools available. Now, we're anxiously waiting to see what people do with them." How can we ignore this challenge?

Model for Future OS-9 Applications

Bill Brady addressed the OS-9 standards problem best when he said, "After you learn your 50th piece of software, you lose interest." That may be the reason you only need to double click on a *Multi-Vue* icon to run *WizPro*. It's quite relaxing to lean back and watch

Dale L. Puckett, a freelance writer and programmer, serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. His username on Delphi is DALEP; on packet-radio, K0HYD @ N4QQ; on GENIE, D.PUCKETT2; and on CIS, 71446,736.

WizPro connect you to your favorite bulletin board or forum. *WizPro* is an important product with an impressive list of features. The program's most important feature, however, is the standard it sets for future OS-9 application software — especially in the user-interface arena.

Brady has always encouraged fellow developers to release software that's intuitive and friendly. The CoCoBin standard he designed and placed in the public domain is a perfect example. Yet, many of the people who should promote this move toward an intuitive and detail-free user interface, discourage and prevent its growth.

I write this after downloading my first CoCoBin XModem file from GENie recently. Brady, the OS-9 SysOp on GENie, had E-Mailed me an updated pre-alpha version of *WizPro*. After starting the XModem download, I instructed *WizPro* to receive it. A few seconds later, I was amazed when my screen displayed a window that looked like a MacBinary file from one of the many Macintosh bulletin boards.

As if by magic, *WizPro* knew the name of the file it was receiving and the number of blocks in the file. As the download proceeded, *WizPro* kept me informed of the download's progress. Later it saved the program in a file and gave it the name that file had on Brady's computer. CoCoBin also automatically took care of the file attributes and other details I once handled manually. All I had to do was run the new program.

Automatic file transfer is only the beginning. Now that Brady has shipped the alpha test version of *WizPro*, he's installing the full CoCoBin II standard. Now when you download a *Multi-View*-based program with *WizPro*, you will receive the program, the *Multi-View* AIF file and the icon file for the program — all automatically. When the download is complete, each file will be stored individually. You only need to move the program file to your CMDS directory, the icon file to your CMDS/ICONS directory and the AIF file to any working directory. To run your new program, just double click on the icon.

Once you use *WizPro* to download a file uploaded in CoCoBin format, you'll never want to return to straight XModem. Knowing that we published the CoCoBin standard more than a year ago and the CoCoBin II standard more recently, I asked Bill why CompuServe and Delphi have no files available in this format.

Brady said that the SysOps have been

discouraging the use of the CoCoBin standard and seem to prefer that everyone download on XModem. "Unfortunately, after you download a straight XModem file you aren't finished," Bill explained. "Before you can run the program you just downloaded, you must load it into memory and save it to a new file or run the OS-9 verify utility against it. Then you must run the OS-9 Attr utility to set the execute bits on the new file, or you still won't be able to run your new program. Who needs it?" he ended.

"For OS-9 to survive in the CoCo market, the number of application programs must rival the number available for Disk BASIC-based Color Computers."

The Macintosh SIGs on the major national data services were leaders in the creation of the MacBinary standard. The SysOps recognized that it was unnecessarily complicated for the end user to download a file containing a Macintosh application program. They needed a better way. If they didn't find it, their subscribers would stop downloading files. They would lose online time, and worse, their users wouldn't have access to the many new tools that were being developed and placed in the public domain. Our own SysOps should follow this wise decision.

In addition to the CoCoBin standard, Bill Brady has donated other products to the public domain. His *WizXmod* — a BASIC09 procedure used to add XModem transfer capability to a program — has been available in RAINBOW's Delphi OS-9 Online and other national data services for nearly a year.

FMenu

This month we feature FMenu — a new creation that Brady has put in the public domain. Use FMenu in *WizPro* when you send a file to the host computer. Adding FMenu as a subroutine or procedure to your BASIC09 application program allows you to select a file from any OS-9 directory. The code for FMenu appears in Listing 1.

FMenu works like — though better than — the standard file dialog Apple gives Macintosh users. The standard file dialog box is one of the major reasons every Macintosh application program opens, closes and saves files in a similar manner. If we want OS-9 to survive in today's market, we must create a consistent and intuitive user interface. We can begin this process by including FMenu in our OS-9 programs.

Use FMenu to move up and down a list of files in any directory by striking the up and down arrow keys. When the file you want appears in the window at the bottom of your screen, press ENTER to select it. Brady uses the arrow keys instead of a mouse because the computer cannot display the mouse's position on a text-only screen, and *WizPro* is designed to work in a text window (for increased display speed) or in a graphics window. I suggested that Bill add a GMenu subroutine that would allow mouse selection of files when *WizPro* is run in a graphics window. (I think he agreed.) Perhaps we will soon have GMenu in the public domain as well.

FMenu offers a quick-find feature. Thus, if you *think* you know a filename but you don't know its spelling, type the first few character of the filename. FMenu will move to the first file with a similar name. (You might even find it the first try.) When you select a directory, press ENTER to move into it. You can skip the directory names and move to the filenames by pressing the space bar. You can return to the beginning of the directory you are listing by pressing ALT-up arrow. Pressing ALT-down arrow takes you to the bottom of the directory listing.

WizPro — A Closer Look

When I asked him to define *WizPro*, Brady said, "It's a telecommunications program that does terminal emulation, but those definitions only scratch the surface. *WizPro* is entirely user redefinable. You can run in a text window or a graphics screen. *WizPro* is also user extendible. You can replace any procedure and add new protocols, autopilots and procedure creation programs. You can even add another terminal program as an extension."

Why would you want to modify your terminal program? Hosts and data services often change their protocol. With *WizPro*, you won't have to rewrite an entire *Comus* program to adopt to a new host — you only need to change the extension. Brady feels *WizPro*'s extendibility should remove much of

the delay that follows the changes made by host systems.

Brady also explains why you might add another terminal program as an extension of *WizPro*: "If you really like a particular public domain terminal program, you can run it as an extension of *WizPro*. When you do this, you pick up a few fringe benefits, too. *WizPro* takes care of all the antologging, record keeping, screen initialization, colors, fonts, etc. — all the dirty work — before it gives control to the other program."

WizPro makes it easy for you to run extension programs, too. When you call these from the menu, *WizPro* passes an initialization string that contains all of the parameters you once had to remember and type at the OS-9 prompt.

What makes *WizPro* different from other terminal programs available on OS-9? According to Brady: "The others are designed to be used in a limited set of circumstances with a specific host or a specific computer and a single baud rate. *WizPro* works with any host at any rate."

Although *WizPro* has grown from the discoveries made during the development and servicing of *Wiz*, *WizPro* does not replace *Wiz*. Rather, the program is designed to combat obsolescence.

WizPro includes mouse pause (or is it mouse paws?) that brings the host to a halt when you click the mouse. Now you'll never watch a message scroll off the screen before you can read it.

Clipper is another new feature Brady has added to the program. By pressing ALT-up arrow, you can browse through an 8K buffer that contains the

most recently received text. With Clipper, you can receive new text online while you view the buffer. You can mark a series of lines and send a snapshot of them to a file, your printer or modem. You can even load the buffer from a file stored on your computer and send a snapshot to the modem or printer.

Brady has improved his conference mode. Now you can use all the control keys except CTRL-X while in the conference mode. Brady can add this function because *WizPro* knows what is happening when it calls an extension. So if you enter Clipper while in the conference mode and try to send some text or a file to the host, *WizPro* will switch into the half-duplex time delay mode and send the information. This is the only mode most services will let you use in conference mode. *WizPro* knows that and acts accordingly.

Writing a Program Longer Than 64K

WizPro is so functional because it uses more than 64K of memory (128K of memory in your CoCo 3). Brady shared a few of his secrets with me:

"I can use more than 64K of memory because I overlay procedures and move them in and out of the 64K process space *WizPro* uses," Brady said. "*WizPro* always leaves two 8K blocks of memory free in its 64K process space. All the real-time spacecraft telemetry and command software used by NASA is written in a similar manner."

Through careful design and construction of the program, Brady makes sure that there are always two 8K blocks available. He uses three blocks for data storage, one block as an 8K buffer and

two others to hold an additional 4K of *WizPro*'s variables. Out of the eight 8K blocks in a 64K workspace, six blocks have been used. There are two blocks left.

Brady keeps those two 8K blocks free and uses them to run the *WizPro* extension procedures. He switches them into the 64K process space with the BASIC09 RUN command. After they have done their job, he switches them out of *WizPro*'s 64K space by using the KILL command. Because of BASIC09 and OS-9's excellent design, these extension programs can be located either in the remainder of your CoCo 3's 512K of memory or in a file on one of your disks.

If you want to use Brady's trick to build your own giant BASIC09 programs, you'll need to be aware of one more detail. Brady loads the name of the command he wants to run in a string variable and then runs the string. An example helps clarify this procedure.

First, Brady dimensions a 32-byte string variable named Proc. Before *WizPro* calls the XModem procedure, it initializes Proc in this manner: proc = "XModem". The program then runs Proc and passes any necessary variables. The command line should read something like this:

```
run proc (paths,colors,flags
... fonts, port)
```

The ellipsis in the program line stands for a number of variable names not typed. In some cases, Brady passes 23 variables to a *WizPro* extension procedure. When he passes these parameters, he is giving the extension procedure access to everything *WizPro* knows.

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To use this BASIC09 feature, Brady had to carefully organize his program. You will need to do the same. You must also kill each procedure after it runs, or you will run out of space. Most of the time — all the time if you load your packed modules into memory before you run your program — your program won't slow down. When you run the procedures, OS-9 just switches them into the program's workspace. When you kill them, they are switched out. The program does this by toggling a few bytes on your CoCo 3's GIME/ memory-management chip.

Because *WizPro* is interrupt-driven, it is fast and behaves well in OS-9's multitasking environment. *WizPro* doesn't take over your computer. *WizPro* XModem can download a long file in one window while you play flight simulator in another window. In addition, *WizPro*'s front end driver *WizAcia* (also released to the public domain) is signal driven. Therefore, program extensions can be called by the host if a certain byte or byte sequence is received, and all of this happens automatically, transparent to the user at the host's command.

Another look at *Gfx3*

If you're a seasoned BASIC programmer, I'll bet you've already caught the mistake in the two nested IF-THEN-ELSE decision trees in *Gfx3*. I should have assigned the variable *Act* to a value of 1, 2, 3, etc., instead of 100, 200, 300, etc. You must make this change to get *Gfx3* to perform properly.

When you get ready to create your own *Gfx3*, make sure that you type the names of the actions exactly the way you defined them in *Gfx3* in the calling program. For example, if your *Gfx3* decision tree is looking for an action named *ss.wnset*, then you must type *ss.wnset* exactly that way in the run *gfx3* ('*ss.wnset*') line in your calling program. *Gfx3* is extremely case-sensitive. The calling program must spell the action verb right.

After writing *Gfx3*, I discovered that the module is 2,089 bytes when packed. The original BASIC09 code was 3,806 bytes long and uses 76 bytes to store data. Since this data memory comes out of RunB's 8K memory pool, this will not take any additional 8K memory blocks.

Listings Show *Gfx3* Benefits

To see the benefit of having a subroutine package like *Gfx3* available for your own BASIC09 programs, compare the two different modifications of the

MVShell code (listings 2 and 3). The first listing comes from a program I named *MVShell2*. It exercises the menu bar we created in June and July with OS-9 System Calls. The other listing comes from *Gfx3Test* and exercises the menu bar in the same manner as does the *MVShell2*. Compare the two listings. You'll want to get right to work on your own *Gfx3*.

"Because WizPro is interrupt-driven, it is fast and behaves well in OS-9's multitasking environment. WizPro doesn't take over your computer. WizPro XModem can download a long file in one window while you play flight simulator in another window."

We're starting both listings cold with *RUN Gfx2(StdOut,"CurOff")* from the July column's listing. This will let you add both versions of the code to different copies of *MVShell*. When you run it, you will see the menus pop down and receive a report telling you which menu number and item was selected when you clicked the mouse. Unfortunately, I didn't get a chance to write the code that runs when you make a menu selection. It's designed, however, and should be in a later column.

My *Gfx2* file is 2,497 bytes long — 2,250 for the original *Gfx2*, 94 bytes for *InKey*, 99 bytes for *SysCall* and 54 bytes for *Cls*. If I merge my present *Gfx2* and the *Gfx3* files, I will use 4,586 bytes out of an 8K block. That leaves 3,605 bytes in the 8K block of memory used by OS-9 when it loads *Gfx2* and *Gfx3* from the same file. There are an additional 3,605 bytes to use as we like.

We could do several things with this memory. We could, in fact, use it to make the Tandy Menu functions available on all our BASIC09 programs. Yes, I think a 3,600 byte subroutine module is in order. We'll shoot for that listing in the November column.

About Those Missing Lines

The laser-writer gremlins zapped John Lind's listing, *Skipmuf.p* in the June issue. Lines 71 through 78 are missing. Lines 71 through 76 contained definitions, so you *definitely* need them. Here are the missing lines from *Skipmuf.p*:

```
70 mo:ARRAY [1..12] of real;
71 results:ARRAY [1..24] of
real;
72 moname, printpath:ARRAY
[1..12] of char;
73 call:ARRAY [1..12] of char;
74 ocntnt:ARRAY [1..12] of
char;
75 name, ocity, ocntry:ARRAY
[1..12] of char;
76 moarray:ARRAY [1..12] of
monthstr;
77 $PAGE
78 $SUBTITLE Procedure dwset
79 * 80 * DWset - procedure to
create a device in a window of
81 * type 'sty.'
82 *
```

John is presently working on a satellite orbit computation program. He's writing it in BASIC09 first and promises to share that version with you here. Thanks, John.

Double-Sided Disk Access

If OS-9 Level 1 users don't love Steve Goldberg, they will after they look at this month's listings. Goldberg has created an OS-9 procedure file that will patch your CCDisk driver and Format command to use double-sided disk drives with OS-9 Level I, Version 2.00. He asked me to pass it along.

Diskfix adds the new code to the end of the existing CCDisk module and leaves you with your new CCDisk module in a file on Drive /d0. After you run *Diskfix*, run *OS9Gen* to produce a new boot file. Once *OS9Gen* has created your new *OS9Boot* file, you'll be off and running on double-sided disks.

Diskfix is compatible with all previous patches to change the step rate of the drives. In fact, the other patches can be done either before or after you run *Diskfix*. However, you must remember to change *IT.SID* at an offset of \$19 bytes in your device descriptors /d0 and /d1 from one to two, so that OS-9 will know that you have installed double-sided drives.

The day I was going to send a copy of *Diskfix* to RAINBOW, I got another

letter from Goldberg: "Hold the presses! Pull the front page! Here's the ultimate patch for CDDisk," he wrote. Goldberg's new version reads the track count, number of sides and the head step rate from the device descriptor. Now you can have several drives with different step rates, and numbers of tracks and sides on the same Level I, Version 2.0 system.

Set the step rate to your disk drives by patching your device descriptor modules at an offset of \$14 hex from the beginning of the module. You can do this with debug or modpatch. An easier way, however, is to use a Dmode utility.

You will not be able to boot from a double-sided disk since the Boot module is hard-coded for one side only. However, you can boot up with a single-sided disk and then switch to a double-sided disk or keep the original drive as your system drive and use a double-sided drive for your data.

Steve's procedure, FormatFix, gives you the ability to format single-sided disks on double-sided drives. It uses a trick submitted by Ray Nicklas published in the May '84 issue of RAINBOW [Page 300].

Making Text Windows Fast

Let's review MakeGW, a procedure for making graphics windows first published in *The Complete Rainbow Guide to OS-9 Level II: A Beginners Guide to Windows*. I have been merging mgw ever since we wrote the book. Recently, I began thinking about being able to change a window to a text window quickly. With one small change and a few more OS-9 command lines, the change was complete. Here's the original MakeGW:

```
* First, kill the window we're
running in
display lb 24
* Now, create a new window
* This one is the standard 80 X
24, four color one we use most
of the time
display lb 20 7 0 0 50 16 1 0 4
* Set the window to the right
font
display lb 3a c8 01
* And finally, select the win-
dow we just created
display lb 21
```

Type the display commands above (You can skip the comment lines if you

want) into an OS-9 file, using your favorite editor. Then put the output of the procedure file into a file using OS-9's merge abilities.

```
makegw > mgw
```

Any time you need to change any screen to a four-color, 80-by-24 graphics window, type merge mgw and press ENTER. Your new screen will appear like magic. After you make mgw, copy MakeGW to a new file named MakeTW (for Make Text Window). Use your editor to make the second display command line read:

```
display lb 20 2 0 0 50 16 1 0 4
```

After you have edited MakeTW, run it and merge its output into a new file named mtw. Now when you want to change that slow graphics window into a fast text-only window, type merge mtw, and press ENTER.

That's it for October. Join me next month, and we will continue to explore the functions of OS-9 Level II and *Multi-Vue*. □

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Dr. Nibble

By Kelly Taylor



Listing 1: FMenu

```

PROCEDURE FMenu
$399  (* A demonstration program that shows you how to build a standard
$341  (* file handling menu into your Bealt99 programs. FMenu was
$37E  (* written by WizPro author Bill Stady who is presently adding
$38D  (* mouse support. Stady has released this code into
$3F1  (* the public domain. He plans on releasing the final version with
$478  (* full menu support -- even in a text screen -- also. Stay tuned!
$479
$48C  (* First we must define a few data types that we built into WizPro
$4FB  (* then we'll be on with the demo. You may find many of these
$43C  (* equates useful in your own Bealt99 programs. They are smaller
$27A  (* to those used in the KISSDraw and MVShell code we published
$28F  (* earlier this year.
$299

TYPE wpaths=sp,spa,vpa,dpa,ppa:BYTE; riop,piop:STRING[3]; he

,rxfile,heer:STRING; epd(32),olderr(32),newerr(32):BYTE
DIM ptttr:wpttr

$2E5
$2EE
$2EF  TYPE window=fttl,flat,rtat,bttm:STRING[9]; vt89,vt49,gwin

,main:STRING[12]; menu:STRING[63]; mes:STRING[42]; tmenu

,tmtr:STRING[15]; atk,prmt:STRING[9]
$356
$35F  DIM win>window
$369

TYPE remend=dvnd,dwel,ewnd,detctet,ulon,loff,pel,hdde

:STRING[2]; Dlpet,FRpet,ATpet,br,buimn,group,revaff,

rtw,prop,propoff,bold,boldef:STRING[3]; fewr,paltrt

:STRING[4]
$3D2
$3DB  DIM tmds:remend
$3DC  TYPE flg=erie6554,TEXT,gmode,toll,buftoll,thdfl,vt52,vrnt1

,OPLOPEN,spopen,WPAOPEN,SPAOPEN,FSP,BLDF,tentf,pel,dtd

,axlt,sk,dup,mv:BOOLEAN
$437
$449  DIM flge:flg
$441

TYPE tellt=ttttat,gtttat,ttttt,ettetn,tttd,vrt,vrtln,ttset,

siep,pid,satpri,peg,bau,typ,paw,aif,ath,eot,anf,qr

,Inttpt,opt,bop,bso,bse:BYTE
$4AC
$4B5  DIM raw:caia
$4B6

TYPE ton=eat,tt,lf,br,bl,home,tie,ptabl,lbrk,BK:STRING[1]; Kkey

:BYTE
$4F9  DIM entrl:ton
$4F9
$4FA  TYPE strlgt=ddlt,rttt,ektt,pnt:STRING; entlmt:STRING[8]; hh

,mm:INTEGER
$526
$52F  DIM tttg:strings
$539

TYPE PRNq=forePRN,backPRN,menufottPRN,menubackPRN,otherfotaPRN

,etherbackPRN,tutPRN,mtuutPRN,othertutPRN:STRING[1]

$569  DIM PRNt:PRNq
$569
$56A  TYPE tttg=ttde,a,b,dp:BYTE; x,y,u:INTEGER
$5BF  DIM t:ttg
$598
$599  DIM manwin,point2,point,pelnt1,box,bex1,box2:STRING[6]
$5BD  DIM wldTYPE,borderPRN:STRING[1]
$5CD  DIM dwat,ewat,ttttta:STRING[2]
$5E1  DIM tomm:STRING
$5E8
$5E9
$5EA  (* We must also initialize a few of the fields that we used in the
$62D  (* demo program. The data types above are just a few of the parameters
$674  (* passed to WizPro extension programs.
$69B  entrl.tls=CHRS(90C) \entrl.hemt=CHRS(1)
$6B4  entrl.tt=CHRS(13) \entrl.lf=CHRS(10)
$6CC  entrl.be=CHRS(8) \entrl.bl=CHRS(7)
$6E4  entrl.lbrk=CHRS(133)
$6F9  entrl.asc=CHRS(27)
$6FC  entrl.mkey=3
$797  tmds.hddt="g2"
$714  emda,four=entrl.ct+entrl.tt+entrl.tt+entrl.tt
$73B  tttg.ektt="Any Key to Continue"
$757  tttg.rttt="ENTER" to Continue"
$776  tttg.pnt="Path not Ready"
$793  entrl.ptabl=CHRS(127)
$79F
$7A9  (* System Equates
$7B1  raw.tttttt=58G \raw.tttt=589 \raw.ttttt=525
$7D6  raw.ttttt=58E \raw.tttt=59A \raw.ttttt=58D
$7FA  raw.vrt=58A \raw.vrtln=58C \
$813  raw.ttttt=583
$81F  raw.pau=5
$82A  raw.sot=12 \raw.andof=13 \raw.qut=18 \raw.inttpt=17
$856  raw.opt=9 \raw.bop=19 \raw.bse=3 \raw.bso=19
$882  raw.aif=6
$88D  raw.baw=22 \raw.typ=21
$8A3  raw.peg=9 \raw.ath=5

```

```

9839 ssw.pid=$PC \sw.sstp=i=$PD
98D1 smds.dsfclos=CHRS(27)+CHRS($39)
98E2
98E3 (* Ssssn Equass
98F4 sntsl.BK=STR$(15)
990F sds.hdds="2"
990C flags.TEXT=TRUE
9916 smds.swnd=sntsl.sss+CHRS($23) \smds.dwnd=cns1.asc+CHRS(24)

) \cnds.pel=sntsl.sss+CHRS($31)
9951 smds.defcolor=sntsl.sss+CHRS($39) \smds.dwsal=sntsl.sss+CHRS

($21)
smds.DLpss=CHRS(2)+CHRS(32+16)+ "1"
smds.FRpss=CHRS(2)+ " "+"1"
smds.ATpss=CHRS(2)+CHRS(32+48)+ "1"
smds.ssv=CHRS($1F)+CHRS($29)+CHRS($9) \smds.ssvsf=CHRS($1F)
+CHRS($21)+CHRS($9)
99E7 IF flags.TEXT THEN
99F3 sds.bold=CHRS($)+CHRS($)+CHRS($)+
9A07 smds.bldoff=smds.bold
9A16 cnds.prop=smds.bold
9A25 smds.psspsf=smds.bold
9A34 ELSE
9A38 smds.bld=sntsl.sss+CHRS($3D)+CHRS(1)
9A59 smds.bldoff=sntsl.sss+CHRS($3D)+CHRS($9) \smds.prsp=sntsl.sss

+CHRS($3F)+CHRS(1)
smds.psspsf=sntsl.sss+CHRS($3F)+CHRS($9)
9A89 ENDIF
9A98 smds.ulsn=CHRS($1F)+CHRS($22) \smds.uloff=CHRS($1F)+CHRS($23)
9A9A

)
9ABE
9ABF (* Windv Equass
9AD9 PRNs.fss=PRN=CHRS($9) \PRNs.bskPRN=CHRS(1) \bsrderPRN=PRNs.bskPRN
9AF3 IF flags.TEXT THEN
9AFF wldTYPE=CHRS(2)
9B07 PRNs.surPRN=CHRS($9) \PRNs.fossPRN=CHRS($9)
9B1F PRNs.bskPRN=CHRS(1)
9B2B PRNs.msnussPRN=CHRS(2) \PRNs.menuforePRN=CHRS(19)
9B43 PRNs.msnbskPRN=CHRS(3)
9B4F PRNs.sshrcutPRN=CHRS(4) \PRNs.sshrfssPRN=CHRS(12)
9B67 PRNs.sshshskPRN=CHRS(5)
9B73 ELSE
9B77 wldTYPE=CHRS(5)
9B7F PRNs.menuforePRN=PRNs.fossPRN \PRNs.menubskPRN=PRNs.bskPRN
9B9D PRNs.sshrfssPRN=PRNs.bskPRN \PRNs.othsbkPRN=PRNs.fossPRN
9BBE ENDIF
smds.swnd=sntsl.sss+CHRS($23) \smds.dwnd=sntsl.sss+CHRS($24)

) \smds.dwsal=sntsl.sss+CHRS($21)
98FA dwsal=sntsl.sss+CHRS($29) \ovset=sntsl.sss+CHRS($22) \swssss

=sntsl.sss+CHRS($25)
9C2A vln.bstom=dwsal+CHRS($9)+CHRS($9)+CHRS(23)+CHRS($9)+CHRS(1)+
9C2B
PRNs.othsbkPRN+PRNs.sshrfssPRN
9C59 vln.sst=dwsal+CHRS($9)+CHRS($9)+CHRS($9)+CHRS($9)+CHRS(2)+PRNs.sshrfssPRN

+PRNs.sshshskPRN
9C87 vln.main=smds.dwnd+dwsal+wldTYPE+CHRS($9)+CHRS(2)+CHRS($9)

+CHRS(21)+PRNs.surPRN+PRNs.bskPRN+bsrderPRN
9CC9 vln.asl=dwsal+CHRS(1)+CHRS(18)+CHRS(18)+CHRS(44)+CHRS(3)+PRNs.msnrcutPRN

+PRNs.menubskPRN
9CEE vln.prrps=sntsl.sss+CHRS($9)+CHRS(24)+CHRS(19)+CHRS(33)+CHRS(1)+

PRNs.surPRN+PRNs.bskPRN
9D1C
9D1D (* Nass hese shas swssone whs pussheas WlzPss wll secelve a
9D5B (* sapy of she sniss WlzEquasss flls ln sssss form. WlzEquasss
9D9C (* ls ss wll dss thas is wll mks wrssng ysar sun WlzPss extenss
9DE3 (* msh easler. All sf the basng work sf dsslng dase
9E1B (* typss and oshes varlssls hss bssn dssn far ysu. WlzPss ssn be
9E5D (* tald so pss she enslss squass psaket ts ysus swn WlzPss exanssln
9EA3 (* when you run thm. Thls osans ysu ssn use all sf she WlzPro
9EE3 (* deflnlsslns lnsssd os stersng fssm asrassh and bulldng ysus own.
9F29
9F2A (* The nssx sds sqssnce pass the wndows on yosr Gslss Compuass
9F6B (* ssssn fss FMenu.
9F7F
9F89 PRINT vln.main;
9F89 PRINT smds.dwsal;
9F92 OPEN #pshs.wpa,'w':UPDATE \flags.WPAOPEN=TRUE \ PUT #pshs.wpa

.vln.bsssm
9FBE OPEN #pshs.sps,'w':UPDATE \flags.SPAPEN=TRUE \ PUT #pshs.sps

.vln.stas
9FEA PRINT #pshs.wpa," Wlz "; \ PRINT #pshs.sps,smds.bld; \

PRINT #pshs.sps," Wlz ";

1929
1921
1922 (* Fmsns sssualy bsglss hssse III
1943
1944 1999 TYPE sssosd=d(29):BYTE; lln:BYTE
195D DIM fmenary:rsord
1956

```

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Please do not submit material currently submitted to another publication.

```

1967 DIM ent(86):STRING|19]
1976
1979 DIM fmi1,kk,111,xx,yy:INTEGER
1989 DIM ea,coh:BYTE
1996 DIM dirpopen,more:BOOLEAN
19A6 DIM char:STRING|1]
19B2 DIM eesrch:STRING
19B9 1992 fmi1=0
19C3 coh=""
19CA 1919 OPEN #ea,"":READ+DIR
19D9 dirpopen=TRUE
19DF ON ERROR GOTO 1969
19E5 SEEK #ea,0
19EE PUT #1,ctrl.cl
19FB FOR kk=1 TO 88 \ent(kk)="." \NEXT kk
1122 more=FALSE
1128 kk=1
112F 1928 REPEAT
1134 SEEK #ea,fmi1 \ GET #ee,fmcntry
1146 IF fmcntry.d(1)>0 THEN \xx=0
1169 ent(kk)="
1168
116C (* scrub the entry, files can be made invisible hence with a filtec
11AE (* like if you see a "." on disc vnc files with extension
11EB (* let fmi1 go ahead back up kk
11F7
11F8 REPEAT \xx=xx+1
1215 ent(kk)=ent(kk)+CHR$(LAND(fmcntry.d(xx),127))
1232 UNTIL fmcntry.d(xx)>127 OR xx=18
124A
124B ent(kk)=ent(kk)+""
125D IF kk=88 THEN mecc=TRUE \fmi1=fmi1+32 \ GOTO 1939 \ ENDIF
127F kk=kk+1
128A ENDF
128C fmi1=fmi1+32.
129D UNTIL EOF(#ea)
12A6
12A7 1939 (* print the suckas!
12B8 CLOSE #ea \dirpopen=FALSE
12CB 111=kk \kk=1
12DA FOR yy=1 TO 111 STEP 6
12F9 PRINT USING "s8<,x2,s8<,x2,s8<,s2,s8<,s2,s8<,x2,s8<,x2,s8<,x2,s8<"
,ent(yy),ent(yy+1),ent(yy+2),ent(yy+3),ent(yy+4),ent
(yy+5),ent(yy+6),ent(yy+7)
1376 NEXT yy
1381 IF mecc THEN PRINT " ** Overflow, 88 oc mecc files in this directory: type + for mor
e **"
:
13D3 ENDF
13D5 1949 (* make selection
13E9 PRINT #paths.wpa,ctrl.cl
13F9 PRINT #paths.wpa,TAB(34): ">";
140B PUT #paths.spe,ctrl.homs
141C PRINT #paths.spa,"DnAccov=next UpArrow=back ALT-Up=Top ALT-Dn=Seccen Space=find next
lowec case"
:
1476 PUT #1,win.msk
1483 elays=elays+1
148F PRINT USING "s42^n","Selecc name hic <Enter>"
1482 PRINT
1484 PRINT USING "s42^n","<filename> or </full/pachnmc>";
14DF (* enable keyense
14F1 s.e=0 \s.b=$27 \s.s=1 \RUN a9scell(cav.scatec,1)
1525 PUT #1,win.pmpc
1532 elays=elays+1
153E PRINT USING "s28^n",ent(1);
154E scacch=""
1555
1556 REPEAT
1558
1559 (* seftvece key bounce filtec
1576 1942 s.e=0 \s.b=$27 \RUN a9scall(cav.gstet,s)
15A2 IF s.a>4 THEN
15B1 fmcntry=s.e
15B8 s.x=5 \RUN a9scell(cav.sleep,s)
15DA s.e=0 \s.b=$27 \RUN a9scall(cav.gccsc,s)
1593 IF s.e<>fmcntry THEN 1942
1517
1518 (* Space Sec
1525 IF LAND(s.e,s89)=569 THEN
1539 REPEAT \ IF kk<111 THEN kk=kk+1 \ ENDF \ UNTIL kk=
111 OR ASC(ent(kk))>97
1568 GOTO 1944
156F ENDF
1571
1572 (* up eccev
157D IF LAND(s.e,s88)=568 THEN
1591 IF kk<1 THEN kk=kk-1 \ ENDF
15A9 ENDF
15AB
15AC (* down eccev
15B9 IF LAND(s.e,s19)=519 THEN
15CD IF kk<111 THEN kk=kk+1 \ ENDF
15E6 ENDF
15EB
15C9 (* alt-up

```

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```

1672      TF LAND(r.a,12)-12 THEN
1674          kk=1
1676      ENDIF
1678
1679      (* sit-down
1679      IF LAND(a.a,514)=514 THEN
1679          kk=111
1679      ENDIF
1679
1679      (* print current selection
1679      PUT #1,rntrl.rle \ PRINT USING "e3g",ent(kk);
1679
1679      ENDIF
1679
1679      (* end of keyrenre prorerelng
1679
1679      (* do a regular key
1679      RUN grkey(char) \ TF char>" THEN
1679      PUT #parhr.wpa,rhar
1679      IF rhar="+" OR rhar="-" THEN COSDB 2999 \ GOTO 1919 \ ENDIF
1679
1679
1679      TF char<rntrl.r AND rhar<"/" THEN
1679      PUT #1,rntrl.rlr
1679      (* user is ryping filename
1679      searrh=searrh+rhar \kk=1
1679      REPEAT \ IF kk<111 THEN kk=kk+1 \ ENDIF
1679      UNTIL kk=111 OR LEFT(ent(kk),LEN(searrh))=rharrrh
1679      IF kk=111 THEN PRINT #parhr.wpa,rntrl.bl; rntrl.rlr \
1679
1679      PRINT #parhr.wpa,TAB(34); ">"; \srarch=" \ ENDIF
1679
1679      GOTO 1944
1679      ENDIF
1679      ENDIF
1679
1679      r.x=4 \RUN r9arall(rev.rleap,r)
1679
1679      UNTIL rhar=rntrl.r OR rhar="/"
1679      PUT #1,rntrl.cls
1679
1679      (* user wants to type a pathname
1679      IF rhar="/" THEN INPUT "/".romm
1679      comm="/"+romm
1679      GOTO 1958
1679      ENDIF
1679      romm=rnt(kk)
1679
1679      (* Find out if our selection is a Dir or a file
1679      (* If a Dir make it our nrv DDIR (current working dir)
1679      ON ERROR GOTO 1959 \en=9 \ CHD romm
1679      1959 en=ERR \ IF rn=9 THEN IF comm<>". THEN rrrg.ddir=comm \ ENDIF
1679
1679      \ COSDB 2999 \ GOTO 1999 \ ENDIF
1679
1679      ON ERROR GOTO 1979
1679      1959 en=ERR
1679      IF en=211 THEN 1939
1679      IF en>9 AND en<195 THEN PRINT #parhr.wpa,"*err": rn: \ ENDIF
1679
1679
1679      ON ERROR GOTO 1979
1679
1679      (* keyrenre off
1679      r.r=9 \r.b=327 \s.x=9 \RUN r9arall(rev.rtrtet,s)
1679      IF dirpopen THEN CLOSE *as \ ENDIF
1679
1679      COSDB 2999
1679      PUT #1,rntrl.rlr
1679      PRINT #1,"You have retrtet a file named, "; romm
1679      PRINT #1,"Let's call thr Shell and find ltr attributer!"
1679      PRINT
1679      SHELL "atrx "+comm
1679      PRINT
1679      PRINT "Type 'CONT' to try for another file!"
1679      PAUSE
1679      GOTO 1999
1679      END
1679
1679      (* Thr lr rha normal exit of FMenu.
1679      (* 5999 lr the FMenu's normal error exit.
1679
1679      1979 en=ERR \ ON ERROR GOTO 5999
1679      COSDB 2999
1679      IF rn>2 THEN
1679      PRINT #parhr.wpa,"Dirrrtory Error": en;
1679      GOTO 5999
1679      ENDIF
1679      RETURN
1679
1679      1979 (* rlore vindowr
1679      ON ERROR GOTO 2994
1679      PUT #1,rmdr.ovend
1679      olays=olays-1
1679      PUT #1,cmde.ovend
1679      olays=olays-1
1679      1979 en=ERR \en=9 \ RETURN
1679
1679      5999 PRINT "You have exired with error numbr": en
1679      END
1679

```


Listing 2: Mod1

```
(* Leave this code in MVShell from the August issue of
(* KISSable OS-9. It should follow the line that reads
(* 'RUN Gfx2{StdOut,'CueOff'})

(* First, we'll make a SysCell with the Set Window function
(* code to prove that it works.

CallCode:=SSE \(* Set Statue Code
Reg.e:=StdOut
Reg.b:=SSE \(* SS_WinSet function code
Reg.x:=ADDR(WedSee)
Reg.y:=WT_FWin

RUN SysCell(CallCode,Reg)

(* We must turn on the mouse and set the global parameters
(* Here we tell the system we are using a high resolution
(* mouse plugged into the eight joystick port.

Reg.e:=StdIn
Reg.b:=SS_GL
Reg.x:=S$J1 \(* HiRes, Right Joystick
Reg.y:=S$FFF \(* Do not change signal
CallCode:=L_SeeSee
RUN SysCell(CallCode,Reg)

(* Now we must tell the mouse how often to update itself
(* and when it should timeout. We also must tell the
(* graphics device to follow the mouse. We do the latter
(* by setting the 6899 Y-register to 'Follow' or '1' before
(* the call. This parameter is undocumented in early versions
(* of the OS-9 Level 11 documentation.

Reg.e:=StdIn
Reg.b:=SS_Mouse
Reg.x:=S$J1 \(* Update / timeout info
Reg.y:=Follow
CallCode:=L_SeeStt
RUN SysCell(CallCode,Reg)

(* Now we set up the 6899 register and make the call
(* to set up the interrupt.

CallCode:=F_lept
Reg.x:=ADDR(IeepeCode)
Reg.e:=ADDR(IeepeCode)+4
RUN SysCell(CallCode,Reg)

(* We'll turn on the Graphics Device so you can
(* watch mouse movement on the screen. We'll make
(* it on screen.

RUN Gfx2("geet",Cap_Per,Per_Arr)

(* The main loop of our future program will start here

LOOP \(* Do this forever

PRINT
PRINT "Type <Control E> or <BREAK> to stop !!!"
IeepeCode.IntResult:=0 \(* Initialize Signal Report

(* Tell mouse which signal you want
```

```
(* It to return when the device is pushed. Do
(* this with the SS_MeSig set status call

Reg.e:=StdIn
Reg.b:=SS_MeSig
Reg.x:=MeSeeSig
CallCode:=L_SeeStt
RUN SysCell(CallCode,Reg)

(* Now we must tell the process to go to sleep until
(* it receives a signal to wake up.

CallCode:=F_Sleep
Reg.x:=0 \(* Sleep forever .. at least until signal
RUN SysCell(CallCode,Reg)

(* After a signal or interrupt wakes up the system, we
(* should be able to find out if it was the mouse
(* that generated the signal by looking at IeepeCode.Result
(* When we arrive here, the process has just awakened
(* and we will test to see if the signal came from the
(* mouse.

EXITIF IeepeCode.IntResult=2 THEN
ENDEXIT

IF IeepeCode.IntResult=MeSeeSig THEN
GOSUB 1999 \(* Go Read MeSee
IF MeSeeCode=WR_Ceet AND MeSeeCode<0 THEN
DeMeSeeCode:=TRUE
ELSE
DeMeSeeCode:=FALSE
ENDIF
ENDIF
GOSUB 2999 \(* Go Check Menu
IF Menu_ID<0 THEN
RUN DeMenu
ENDIF
IF DeMeSeeCode=TRUE THEN
PRINT "The Menu ID is: "; Menu_ID
PRINT "The Menu Item No. is "; Menu_Item
ENDIF
ENDLOOP

(* Always turn off graphics device before leaving program

RUN Gfx2("geet",0,0)

END

2999 \(* Subroutine to check Menu

Reg.e:=StdIn
Reg.b:=SS_MnSel
CallCode:=L_GeSee
RUN SysCell(CallCode,Reg)
MeSee_ID:=Reg.e
Menu_Item:=Reg.b
RETURN

1999 \(* Subroutine to get mouse packet
Reg.e:=StdIn
Reg.b:=SS_Mouse
Reg.x:=ADDR(MeSee)
CallCode:=L_GeSee
RUN SysCell(CallCode,Reg)
RETURN
```

Listing 3: Mod2

```
(* Leave this code in the file MVShell from the August
(* issue of KISSable OS-9. It should replace everything
(* after the line that reads: 'RUN Gfx2{StdOut,'CueOff'})

(* Now we'll make a SysCell with the Set Window function
(* code to prove that it works.

RUN gfx3{StdOut,'ee,wnee',ADDR(WedSee),WT_FWin}

(* We must turn on the mouse and set the global parameters
(* Here we tell the system we are using a high resolution
(* mouse plugged into the eight joystick port.

RUN gfx3{StdIn,"ee,glp",S$J1,S$FFF}

(* Now we must tell the mouse how often to update itself
(* and when it should timeout. We also must tell the
(* graphics device to follow the mouse. We do the latter
(* by setting the 6899 Y-register to 'Follow' or '1' before
(* the call. This parameter is undocumented in early versions
(* of the OS-9 Level 11 documentation.

RUN gfx3{StdIn,"ee,me",S$J1,Follow}

(* Now we set up the 6899 register and make the call
(* to set up the interrupt.

CallCode:=F_lepe
Reg.x:=ADDR(IeepeCode)
Reg.e:=ADDR(IeepeCode)+4
RUN SysCell(CallCode,Reg)
```

```
(* We'll turn on the Graphics Device so you can
(* watch mouse movement on the screen. We'll make
(* it on screen.

RUN Gfx2("geet",Cap_Per,Per_Arr)

(* The main loop of our future program will start here

LOOP \(* Do this forever

PRINT
PRINT "Type <Control E> or <BREAK> to stop !!!"

IeepeCode.IntResult:=0 \(* Initialize Signal Report

(* Tell mouse which signal you want
(* It to return when the device is pushed. Do
(* this with the SS_MeSig set status call

RUN gfx3{StdIn,"ee,me",MeSeeSig}

(* Now we must tell the process to go to sleep until
(* it receives a signal to wake up.

CallCode:=F_Sleep
Reg.x:=0 \(* Sleep forever .. at least until signal
RUN SysCell(CallCode,Reg)

(* After a signal or interrupt wakes up the system, we
(* should be able to find out if it was the mouse
(* that generated the signal by looking at IeepeCode.Result
(* When we arrive here, the process has just awakened
(* and we will test to see if the signal came from the
(* mouse.

EXITIF IeepeCode.IntResult=2 THEN
```

```

ENDIF
ENDIF

IF lccptCode.IntResult=MouseSig THEN
GOSUB 1999 \(* Go Read Mouse
IF mcrct.cstat=VR_Cntrol AND mcrct.cbcs<>0 THEN
DoMenuItem:=TRUE
ELSE
DoMenuItem:=FALSE
ENDIF
ENDIF

IF DoMenuItem=TRUE THEN
GOSUB 299 \(* Go Check Menu
PRINT "The Menu ID is "; Menu_ID
PRINT "The Menu Item is "; Menu_Item
IF Menu_ID<>0 THEN
RUN DoMenu
ENDIF
ENDIF

ENDIF
ENDLOOP

(* Always turn off graphics cursor before leaving program
RUN Gfx2("gcsc",0,0)

END

299 (* Subroutine to check Menu
RUN Gfx3(StdIn,"sc.mnic1",Menu_ID,Menu_Item)
RETURN

1999 (* Subroutine to get mouse packet
RUN Gfx3(StdIn,"gc.mouc",ADDR(mcrct))
RETURN

```

Listing 4: DiskFix

```

* Patched Level 1 Ver. 2
* CCDisk to read, write
* and format both single
* and double sided disks
c
cmode .l .pause
save /d9/ccdisk ccdisk
debug
lccdisk
. .+7
=89
$load /d9/ccdisk
lccdisk
. .+3
=82
lccdisk
. .+1c9
=16
=91
=84
lccdisk
. .+1f8
=5f
=17
=91
=76
lccdisk
. .+2ae
=6
=c9
=99
=c9
=16
=99
=8c
=12
=23
=92
lccdisk
. .+2dd
=49
=12
=12
=12
=17
=99
=99
. .+3
=5f
=16
=99
=81
lccdisk
. .+341
=6
=97
=85
=91
=26
=92
=cc
=49
=c6
=99
=81
=15
=16
=ff
=66
=6
=88
=19
=85
=91
=27
=9a
=64
=64
=74
=7e
=66
=c9
=99
=8a
=49
=47
=c9
=99
=89
=15
=92
=81
=15
=16
=fe
=61
=ca
=a8
=22
=16
=ff
=91
=cb
=19
=8a
=c8
=22
=34
=92
=17
=fc
=87
=35
=92
=39
q
del /d9/ccdisk
save /d9/temp ccdisk
verify u </d9/temp >/d9/ccdisk
del temp
cmode .l .pause
.c

```

Listing 5: FormatFix

```

* Patched the Format utility to
* permit formatting single sided
* disks on double sided drives and
* provided for a choice of number
* of tracks. Use * (asterisk) as an
* option for single sided formatting.
* Use number of tracks in parentheses
* as option to change track count.
c
load format
debug
lformat
. .+1a1
=49
. .+4
=2e
=91
. .+1
=9f
lformat
. .+a85
=99
=8c
=39
q
del .x format
ccve /d9/cmds/format format
unlink format
.c

```


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St. Paul

Steffler

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Taber

Westlock

Westlockwin

Peace River

St. Paul

Steffler

Strathmore

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Alpha Software Technologies	133	Inc.	109	St. John Gallery	133
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Baron Products	91	Orion Technologies	31	Sundog Systems	63
Bob's Software.....	75	Owl-Ware.....	69, 70, 71	T & D Software.....	49, 122, 123
Burke & Burke.....	20, 139	Perry Computers.....	153	Tandy/Radio Shack	33
Cer-Comp.....	38, 39	PXE Computing	7	Tepco.....	141
Cinsoft	78	R.C. Pierce Software	31	Three C's Projects	65
CoCo Connection	77	Rainbow Bookshelf	34, 35	Tomela & Co.....	121
CoCo Gallery Live	117	Rainbow Gift Subscription	127	True Data Products	136, 137
CocoTech	45	Rainbowfest.....	118, 119	Vidicom Corporation	145
Codis Enterprises	113	Rainbow on Tape and Disk	126	Wasatchware	129
Cognitec	29	Rulaford Research	124	Woodstown Electronics	78
Colorware.....	18, 19	SD Enterprises ...	25, 75, 77, 79, 81	Zebra Systems	53
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Hard Drive Specialist	73				
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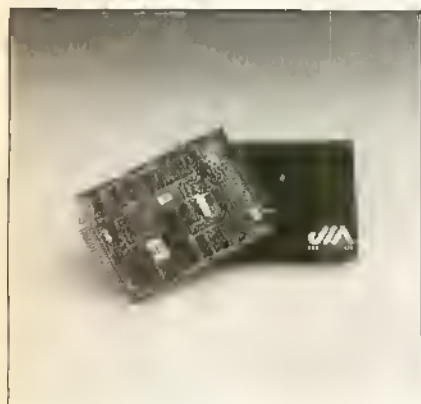
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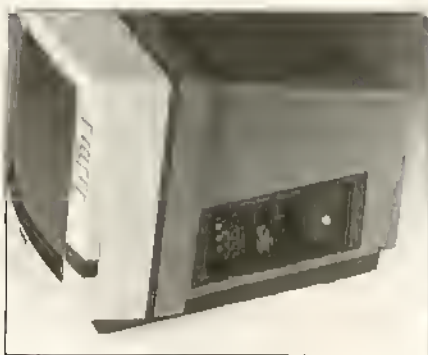
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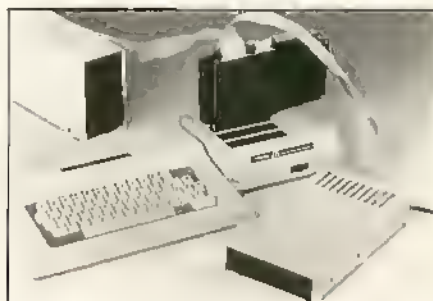
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Thank you. 1988 marks our fifth year of providing quality software for the Color computer. Only your support has made it possible. So, from our hearts, Peg and I thank you. And remember our promise--If you buy it from us, we support it. If you are unhappy for any reason, send it back for a full refund within 30 days of purchase.

Pyramix

This fascinating CoCo 3 game continues to be one of our best sellers. Pyramix is 100% machine language written exclusively to take advantage of all the power in your 128K CoCo 3. The Colors are brilliant, the graphics sharp, the action fast. Written by Jordan Tsvetkoff and a product of Color-Venture.

The Freedom Series

Vocal Freedom

I've got to admit, this is one nifty computer program. Vocal Freedom turns your computer into a digital voice or sound recorder. The optional **Hacker's Pac** lets you incorporate voices or sounds that you record into your own BASIC or ML programs. This is not a synthesizer. Sounds are digitized directly into computer memory so that voices or sound effects sound very natural. One "off-the-shelf" application for Vocal Freedom is an automatic message-minder. Record a message for your family into memory. Set Vocal Freedom on automatic. When Vocal Freedom "hears" any noise in the room, it

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plays the pre-recorded message! Disk operations are supported. VF also tests memory to take advantage of from 64K up to a full 512K. Requires low cost amplifier (RS cat. #277-1008) and any microphone.

Mental Freedom

Would your friends be impressed if your computer could read their minds? Mental Freedom uses the techniques of Biofeedback to control video game action on the screen. Telekinesis? Yes, you control the action with your thoughts and emotions. And, oh yes, it talks in a perfectly natural voice without using a speech synthesizer! Requires Radio Shack's low cost Biofeedback monitor, Cat. #63-675.

BASIC Freedom

Do you ever type in BASIC programs--manually, I mean. If you do, you know it can be a real chore. Basic Freedom changes all that. It gives you a full screen editor just like a word processor, but for BASIC programs. Once loaded in, it is always on-line. It hides invisibly until you call it forth with a single keypress! This program is a must for programmers or anyone who types in programs. By Chris Babcock and a product of Color-Venture.

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As the checkered flag drops your pulse rises in this lively arcade game. The road twists to the horizon on the 3-D panorama that sets the stage for exciting racing. Vie for time as you glide through the curves at incredible speeds. Step through the gears to stay ahead of the pack, but be quick! Some will stop at nothing to see the end of the race, or the end of you! Four challenging raceways, complete with obstacles and colorful 3-D scenery test your skills in this Pole Position™ type game.

32K Color Computer required...\$34.95



Pinball Factory

Video games come full circle in this tribute to the original arcade game, *Pinball*. Classic pinball springs to life as never before, with fresh new angles that only a computer can offer. Crisp graphics, sound, and fast smooth action give this machine-language arcade game a realistic, responsive feel you'll hardly believe. There are even "tilt" buttons that let you "bump" the machine. In addition to playing a great game of pinball, you can enjoy hours of creative pleasure as you design, build, edit, and play your own screens.

64K Color Computer required...\$34.95

Demon Seed

The first waves of flying, diving, bloodthirsty bats are arriving. Move, fire, and move again. It's a never ending battle. If you are lucky enough to defeat the bats, be ready for a much greater challenge, The *Evil Demos* themselves. Destroy a wing and another takes its place. Only a direct hit can save you now. It will take great skill to triumph. If you do, then you better be ready for the *End*. The Demon Flag Ship descends to destroy your remaining ships. Your only hope is to penetrate the hull, break through the shield, and destroy the dreaded Gargoyle.

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